This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Major, Municipal permit. The discharge results from the operation of an 18 MGD wastewater treatment plant with future expansion to 24 MGD. This permit action consists of updating the WQS and updating boilerplate. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq.

1.	Facility Name and Mailing Address:	H.L. Mooney Water Reclamation Facility PO Box 2266 Woodbridge, VA 22195	SIC Code :	4952 WWTP
	Facility Location:	1851 Rippon Blvd Woodbridge, VA 22191	County:	Prince William
	Facility Contact Name:	Steve Bennett	Telephone Number:	(703) 393-2062
2.	Permit No.:	VA0025101	Expiration Date of previous permit:	10/14/08
	Other VPDES Permits associated with this facility:		VAR051424, VAN010018	
	Other Permits associated with this facility:		Incinerator Permit 71751	
	E2/E3/E4 Status:	NA		
3.	Owner Name:	Prince William County Service Authority		
	Owner Contact/Title:	Charles R. Weber Director of Engineering & Water Reclamation	Telephone Number:	(703) 335-7929
4.	Application Complete Date:	May 2, 2008		
	Permit Drafted By:	Alison Thompson	Date Drafted:	January 15, 2009
	Draft Permit Reviewed By:	Joan Crowther	Date Reviewed:	January 23, 2009
	Public Comment Period :	Start Date: 3/16/09	End Date:	4/15/09

5. Receiving Waters Information:

Receiving Stream Name :	Neabsco Creek	River Mile:	1ANEA1.57
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	6	Stream Class:	II
Special Standards:	b, y	Waterbody ID:	VAN-A25E
7Q10 Low Flow:	Tidal (Apr-Oct)	7Q10 High Flow:	Tidal (Nov-Mar)
1Q10 Low Flow:	Tidal (Apr-Oct)	1Q10 High Flow:	Tidal (Nov-Mar)
Harmonic Mean Flow:	Tidal	30Q5 Flow:	Tidal
303(d) Listed:	Yes	30Q10 Flow:	Tidal
TMDL Approved:	Yes (PCBs) No (*E. coli*)	Date TMDL Approved:	PCB 10/31/07 *E. coli* Due 2016

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

✓ State Water Control Law	✓ EPA Guidelines
✓ Clean Water Act	✓ Water Quality Standards
✓ VPDES Permit Regulation	✓ Other (Potomac Embayment Standards) 9 VAC 25-415-10 et seq
✓ EPA NPDES Regulation	

7. Licensed Operator Requirements: Class I

8. Reliability Class: Class I

9. Permit Characterization:

	Private		Effluent Limited	✓	Possible Interstate Effect
	Federal	✓	Water Quality Limited		Compliance Schedule Required
	State	✓	Toxics Monitoring Program Required		Interim Limits in Permit
✓	POTW	✓	Pretreatment Program Required		Interim Limits in Other Document
✓	TMDL				

10. Wastewater Sources and Treatment Description:

This facility is a publicly owned treatment works with a design flow of 18 MGD. Effluent flow rates currently average about 12 MGD. Existing treatment consists of screening, grit removal with coagulant feed (ferric chloride), flow equalization, primary clarification, aeration basins, secondary clarification, denitrification filters, UV disinfection, and cascade post aeration before discharge to the tidal portion of Neabsco Creek at Outfall 001.

Limits are again included with this reissuance for a design flow increase to 24 MGD. The upgrade to the 24 MGD tier is underway, and the nutrient removal cost share is done with DEQ Grant #440-S-08-15. The upgraded facility will have State of the Art (SOA) nutrient removal. A CTO is expected in 2010 for Phase I of the expansion construction.

Five storm water outfalls for the HL Mooney WRF are permitted separately under VPDES General Stormwater Industrial Permit VAR051424.

See the application for a facility schematic/diagram.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow	Outfall Latitude and Longitude
001	Domestic and/or Commercial	See Item 10 above.	18 MGD with expansion to 24 MGD	38º 36' 39" 77º 16' 13"
See Attachment 1 for the topographic map (DEQ #194D – Quantico).				

11. Sludge Treatment and Disposal Methods:

Bar screenings and grit are hauled by truck to the landfill.

The facility produces approximately 5,460 dry metric tons of sewage sludge a year of which 4,960 dry metric tons were incinerated in CY2007. Approximately 500 dry metric tons is hauled to the King George County Landfill when the incinerator is down for annual maintenance.

Gravity thickened sludge is pumped to sludge holding tanks prior to dewatering. The sludge is chemically conditioned with polymer before dewatering by high solids centrifuges. Dewatered sludge is incinerated in a Fluidized Bed Incinerator (FBI). The inert ash is mixed with sawdust and hauled by truck to the landfill. A multiple hearth incinerator was decommissioned in 2006.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge

TABLE 2	
VA0024678	Dale Service Corporation Section 8 Outfall 001. River mile 9.15 on Neabsco Creek.
VA0024724	Dale Service Corporation Section 1 Outfall 001. River mile 0.04 on UT to Neabsco Creek.
1ANEA002.89	DEQ Ambient Water Quality Monitoring Station at Route 1. River mile 2.89 on Neabsco Creek.
VA0025101	PWCSA HL Mooney WRF Outfall 001. River mile 1.57 on Neabsco Creek.
1ANEA000.57	DEQ Ambient Water Quality Monitoring Station midway into Neabsco Bay. River mile 0.57.
There are no known drinking water intakes in the vicinity of the outfall.	

13. Material Storage:

TABLE 3 - Material Storage	
Materials Description	Maximum Volume Stored
Ferric Chloride	48,000 gallons
Pebble Lime	400,000 lbs.
Unleaded Gasoline	2,000 gallons
C217 Polymer	7,500 lbs.
Kerosene	200 gallons
HTH Chlorine Granules	5,000 lbs.
A-23 Polymer	7,500 lbs.
Hydrated Lime	5,000 lbs.
Ultra Low Sulfur Diesel Fuel	32,500 gallons (4 tanks)
Methanol	25,000 gallons
Sodium Hypochlorite	26,340 gallons
Odor Counteractants	825 gallons

14. Site Inspection:

DEQ Compliance and Enforcement staff performed a site visit 10/18/07. A full technical and laboratory inspection was last performed 12/6/06. Copies of the site visit and technical summary have been placed in the reissuance file.

15. Receiving Stream Water Quality and Water Quality Standards:

a) Ambient Water Quality Data

Stations 1ANEA000.57 and 1ANEA000.40 are DEQ ambient water quality monitoring stations in close proximity to the discharge from this facility. Station 1ANEA000.57 is also used as a fish tissue sampling station. Station 1ANEA000.57 is located approximately 1.08 miles downstream from the facility, and Station 1ANEA000.40 is located approximately 1.25 miles downstream from the facility. Due to the monitoring results from both stations, the receiving stream is listed in the 2008 Integrated Report that was approved by EPA on December 18, 2008.

Assessment Unit VAN-A25R_NEA20A02:
Segment begins at the upstream limit of the tidal waters on Neabsco Creek and continues downstream until the start of the open waters of Neabsco Bay, approximately 0.8 rivermile upstream from monitoring station 1aNEA000.57.

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. The advisory, dated 4/19/99 and modified 12/13/04, limits consumption of American eel, bullhead catfish, channel catfish less than eighteen inches long, largemouth bass, anadromous (coastal) striped bass, sunfish species, smallmouth bass, white catfish, white perch, gizzard shad, and yellow perch consumption to no more than two meals per month. The advisory also restricts the consumption of carp and channel catfish greater than eighteen inches long. The affected area includes the tidal portions of the following tributaries and embayments from the I-395 bridge (above the Woodrow Wilson Bridge) to the Potomac River Bridge at Route 301: Fourmile Run, Hunting Creek, Little Hunting Creek, Pohick Creek, Accotink Creek, Occoquan River, Neabsco Creek, Powell Creek, Quantico Creek, Chopawamsic Creek, Aquia Creek, and Potomac Creek.

The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed. The recreation and wildlife uses were not assessed.

Assessment Unit: VAN-A25R_NEA01A00:
Segment includes the tidal waters of Neabsco Bay, beginning at rivermile 1.37, downstream until the confluence with Occoquan Bay.

This segment was included in Attachment C (Plaintiff's list of waters that were added to the 303(d) list in 2002) for pH. In 2008, the pH parameter, first listed in 2002, was delisted. In 2004, the segment was expanded to include all tidal waters of Neabsco Bay. For the 2006 assessment, the NEW-13 special standards designation was removed. In 2008, the segment area was reduced to terminate at the shoreline-shoreline mouth of Neabsco Creek. Also in 2008, the aquatic plants (macrophytes) parameter, first listed in 2006, was submitted for delist.

This assessment unit was noted with an observed effect for chlorophyll-a for the 2006 Integrated Assessment. While nutrients will not be assessed until nutrient standards are adopted, the observed effect will remain due to the previous assessment. For the 2006 assessment, two of 12 samples (16.7%) exceeded the chlorophyll a screening value of 50 ug/L, noted by an observed effect.

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. *E. coli* monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use.

The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed. The wildlife use is considered fully supporting.

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment.

In response, the Virginia General Assembly amended the State Water Control Law in 2005 to include the *Chesapeake Bay Watershed Nutrient Credit Exchange Program*. This statute set forth total nitrogen and total phosphorus discharge restrictions within the bay watershed. Concurrently, the State Water Control Board adopted new water quality criteria for the Chesapeake Bay and its tidal tributaries. These actions necessitate the evaluation and the inclusion of nitrogen and phosphorus limits on discharges within the bay watershed.

A copy of the Planning Statement has been placed in the reissuance file.

b) <u>Receiving Stream Water Quality Criteria</u>

Part IX of 9 VAC 25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream Neabsco Creek is located within Section 6 of the Potomac River Basin, and classified as a Class II water.

Class II tidal waters in the Chesapeake Bay and its tidal tributaries must meet dissolved oxygen concentrations as specified in 9 VAC 25-260-185 and maintain a pH of 6.0-9.0 standard units as specified in 9 VAC 25-260-50. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use. The applicable dissolved oxygen concentrations are presented Attachment 2.

Attachment 3 details other water quality criteria applicable to the receiving stream. Since there is tidal influence at the outfall, dilution ratios will be used in lieu of the steady state complete mix equation.

<u>Ammonia</u>:
The freshwater, aquatic life Water Quality Criteria (WQC) for Ammonia are dependent on the instream temperature and pH. Agency guidance uses the 90th percentile temperature and pH values because they best represent the critical design conditions of the receiving stream. During the last reissuance, the pH and temperature data for DEQ's ambient monitoring station 1ANEA000.57 was evaluated and consequently used to develop the ammonia criteria. Staff believed that the data contained a sampling bias since most ambient samples were collected between 10 a.m. and 2 p.m., the time period of the highest photosynthetic activity in a shallow, open embayment such as the mouth Neabsco Creek. Because of the potential sampling bias, staff used the 50th percentile pH and temperature values for the calculation of the ammonia as nitrogen WQC and the subsequent limits. Through a permit special condition, the permittee conducted pH and temperature monitoring in Neabsco Creek to determine if there was sampling bias and if the pH assumptions were correct.

The permittee submitted a final instream monitoring report in December 2005. A copy of the report was submitted with the application and is also found in Attachment 4. The study provided a better snapshot of the pH conditions in Neabsco Creek during each of the seasons than the limited data pool available during the 2003 reissuance. The 90th percentile pH and temperature from the 2005 study shall be used for the November-January and February-March ammonia criteria with this reissuance. The values used for each of the seasonal ammonia criteria are summarized below:

Table 4a – Acute and Chronic Ammonia Criteria

Season	90th percentile pH (s.u.)	90th percentile temperature (°C)	Acute Ammonia as N (mg/L)	Chronic Ammonia as N (mg/L)
November 1 – February 14 *	8.0 (7.6)**	11.6 (6.7)	8.4 (17.0)	2.9 (6.4)
February 15 – March 31	8.42 (7.8)	10.4 (8.1)	3.7 (12.1)	1.2 (3.2)

* Early Life Stages Absent - Special Standard y
** Values in parentheses are the 50th values and criteria used in the 2003 reissuance

For the April to October ammonia criteria, the permittee proposed to derive a 30 day average criteria using paired pH and temperature data from the 2005 study. DEQ also had a robust data set for the embayment from 2006 for the April to October time period, so the permittee derived a 30 day average ammonia criteria using both paired data sets. The documentation for the derivation of the criteria is found in Attachment 12 as well as on a CD in the permit reissuance file.

Table 4b – Acute and Chronic Ammonia Criteria				
Season	90^{th} percentile pH (s.u.)	90^{th} percentile temperature (°C)	Acute Ammonia as N (mg/L)	Chronic Ammonia as N (mg/L)
April 1–October 31 (PES months)	8.9 (8.2)**	30.11 (24.2)	3.7 (5.72)	0.69 (0.96)

** Values in parentheses are the 50^{th} values and criteria used in the 2003 reissuance

<u>Metals Criteria</u>:
The Water Quality Criteria for some metals are dependent on the effluent's hardness (expressed as mg/l calcium carbonate). The facility had three hardness values from sampling events taken as part of the application submittal. The average hardness of the effluent is 170 mg/l which is comparable to the hardness of 198 mg/L used during the last reissuance. The hardness-dependent metals criteria shown in Attachment 3 are based on the current average.

<u>Bacteria Criteria</u>: The Virginia Water Quality Standards (9 VAC 25-260-170 B.) states sewage discharges shall be disinfected to achieve the following criteria:

1) *E. coli* bacteria per 100 ml of water shall not exceed the following:

	Geometric Mean[1]	Single Sample Maximum
Freshwater *E. coli* (N/100 ml)	126	235

[1]For two or more samples [taken during any calendar month].

c) <u>Receiving Stream Special Standards</u>

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9 VAC 25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Neabsco Creek, is located within Section 6 of the Potomac Basin. This section has been designated with special standards of b and y. Note: the NEW-13 special standard was repealed and is no longer applicable.

Special Standard "b" (Potomac Embayment Standards) established effluent standards for all sewage plants discharging into Potomac River embayments and for expansions of existing plants discharging into non-tidal tributaries of these embayments. 9 VAC 25-415, Policy for the Potomac Embayments controls point source discharges of conventional pollutants into the Virginia embayment waters of the Potomac River, and their tributaries, from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County. The regulation sets effluent limits for BOD_5, total suspended solids, phosphorus, and ammonia, to protect the water quality of these high profile waterbodies.

Special Standard "y" is the chronic ammonia criterion for tidal freshwater Potomac River and tributaries that enter the tidal freshwater Potomac River from Cockpit Point (below Occoquan Bay) to the fall line at Chain Bridge. During November 1 through February 14 of each year the thirty-day average concentration of total ammonia nitrogen (in mg N/L) shall not exceed, more than once every three years on the average the following chronic ammonia criterion:

$$\left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} \right) \times 1.45(10^{0.028(25-MAX)})$$

MAX = temperature in °C or 7, whichever is greater.

The default design flow for calculating steady state waste load allocations for this chronic ammonia criterion is the 30Q10, unless statistically valid methods are employed which demonstrate compliance with the duration and return frequency of this water quality criterion.

d) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched for records to determine if there are threatened or endangered species in the vicinity of the discharge. The following threatened or endangered species were identified within a 2 mile radius of the discharge: Bald Eagle. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and therefore, protect the threatened and endangered species found near the discharge. A copy of the database results has been placed in the reissuance file.

The stream that the facility discharges to is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use.

e) Maryland Water Quality Standards

HL Mooney Water Reclamation Facility discharges to Neabsco Creek, which is a tributary to the Potomac River. The discharge is approximately 0.5 miles from the Maryland State line. Staff reviewed the State of Maryland's Water Quality Standards and believes that the effluent limitations established in this permit will comply with Maryland's water quality standards at the point Neabsco Creek enters the Potomac River.

16. Antidegradation (9 VAC 25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on the following: the receiving waters have been designated as impaired, and the effluent limits are set to meet the water quality standards. Permit limits proposed have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development :

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are the calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:

Effluent data obtained from the permit application has been reviewed and determined to be suitable for evaluation. Effluent data were reviewed, and there have been a few exceedances of the established limitations during the past year. The exceedances occurred for the TSS and ammonia loading limits in May 2008. The high loadings were attributed to extremely heavy rain events that triggered events that caused a pipe in the ferric chloride system to rupture releasing a slug of undiluted ferric into the facility. This was an isolated event and otherwise the facility has maintained an excellent compliance record even during the upgrade and expansion of the facility.

The following pollutants require a wasteload allocation analysis since they were noted in the effluent in quantifiable amounts: Ammonia as Nitrogen, Mercury, Nickel, and Zinc.

b) Mixing Zones and Wasteload Allocations (WLAs):
Neabsco Creek at the point of discharge is a tidal estuary and has tidal influence. For tidal estuaries, chronic wasteload allocations should be based on site specific data of waste dispersion or dilution. Where dispersion/dilution data is not available, a dilution ratio of 50:1 for chronic toxicity is usually recommended as default. Acute wasteload allocations are established by multiplying the acute water quality criteria by 2. The 2X factor is derived from the fact that the acute criteria are defined as one half of the final acute value (FAV) for a specific toxic pollutant. The term "final acute value" is defined as a cumulative probability of 0.05 for the acute toxicity values for all genera for which acceptable acute tests have been conducted with toxicants (Guidance Memo 00-2011).

Staff believes that the guidance for chronic dilution of 50:1 for tidal waters is not applicable to this waterbody because the discharge is located near the fall line where the tidal influence is the smallest, the embayment is very shallow, and has an abundance of macrophytes. Staff's position is that unless dilution is demonstrated through a site-specific study, no dilution is recognized and chronic water quality criteria will be applied at end-of-pipe. PWCSA did conduct a site specific dilution study and near field-mixing analysis in 1997 for Neabsco Creek (Attachment 5). The documentation provided are used as the basis for the chronic toxicity instream waste concentrations summarized below:

Season	18 MGD		24 MGD	
	IWC	Dilution Factor	IWC	Dilution Factor
November–March	37.92%	2.64:1	40.53%	2.47:1
April–October (except ammonia)	39.17%	2.55:1	41.84%	2.39:1

The above values are used to derive WLAs for all chronic criteria except ammonia. Because ammonia decays, the recent PWCSA pH and temperature study in Attachment 6 addressed the decay of ammonia and determined IWCs just for chronic ammonia criteria. In the 2003 reissuance decay was not considered because the 50th percentile temperatures were less than 10°C. Staff's opinion was that nitrification in ambient waters is negligible when temperature is < 10°C.

The instream monitoring found that the winter temperatures were higher than the 50th percentile values used during the 2003 reissuance, so staff allowed decay for the November to March period. The following dilution factors for ammonia are used for limit development with this reissuance:

Season	18 MGD		24 MGD	
	IWC	Dilution Factor	IWC	Dilution Factor
November - January	24.91%	4.01:1	26.63%	3.76:1
February -March	25.88%	3.86:1	27.67%	3.61:1
April–October	18.89%	5.29:1	20.18%	4.96:1

c) Effluent Limitations Toxic Pollutants, Outfall 001 –

9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9 VAC 25-31-230.D. requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N: Limit derivations are found in Attachment 7.

Ammonia as N (April through October)
The following table summarizes the ammonia limits evaluated during this reissuance:

Table 5 – Ammonia (April through October)		
Source of the Monthly Average Limit	**Monthly Average Limit – 18 MGD**	**Monthly Average Limit – 24 MGD**
Policy for the Potomac River Embayments (PPRE)	1.0 mg/l	1.0 mg/l
Water Quality Criteria	3.6 mg/l	3.4 mg/l

Since the PPRE is more stringent than the current Water Quality Criteria, the April through October monthly average limit shall be 1.0 mg/l at both flow tiers. The weekly average limit will be 4.4 mg/l at 18 MGD and 4.1 mg/l at 24 MGD, and they are based on the WQC, mixing zone study, and wasteload allocation described in 15.b. and 17.b.

Ammonia as N (November 1st through January 31st)
Attachment 3 contains the derivation of the Early Life Stages Absent ammonia criteria. Special Standard y lists the Early Life Stages Absent from November 1st through February 14th. Since it is not practical to have limits for half a calendar month, staff has set the limits for November through January. This is a conservative choice to assure protection against chronic toxicity for any consecutive 30-day period during February through March. The limits for November 1st through January 31st are:

Ammonia as N November-January	18 MGD	24 MGD
Monthly Average	No Limit	No Limit
Weekly Average	No Limit	No Limit

Ammonia as N (February through March)
Attachment 7 contains the derivation of the ammonia limits for February 1st through March 31st. The limits are:

Ammonia as N February-March	18 MGD	24 MGD
Monthly Average	4.6 mg/L	4.3 mg/L
Weekly Average	5.5 mg/L	5.2 mg/L

2) Metals:

Mercury, nickel, and zinc all had detectable concentrations in at least one of the three scans done as part of the reissuance package. None of the values were close to the Site Specific Target Values calculated for the facility, so no limit evaluations are needed since there is no reasonable potential to exceed the WQS.

d) <u>Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants</u>

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9 VAC25-260-170.

e) <u>Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients</u>

VPDES Regulation 9 VAC 25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries.

The State Water Control Board adopted Water Quality Criteria for the Chesapeake Bay in March 2005. In addition to the Water Quality Standards, there are three regulations that necessitate nutrient limitations:

- 9 VAC 25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* requires discharges with design flows of ≥0.04 mgd to treat for TN and TP to either BNR levels (TN = 8 mg/l; TP = 1.0 mg/l) or SOA levels (TN = 3.0 mg/l and TP = 0.3 mg/l).

- 9 VAC 25-720 – *Water Quality Management Plan Regulation* sets forth TN and TP maximum wasteload allocations for facilities with design flows of ≥0.5 mgd limiting the mass loading from these discharges.

- 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia* was approved by the State Water Control Board on September 6, 2006 and became effective January 1, 2007. This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. The facility has obtained coverage under the General Permit - VAN010018.

Monitoring for Nitrates + Nitrites, Total Kjeldahl Nitrogen, and Total Nitrogen are included in this permit. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9 VAC 25-820. This facility was upgraded to Biological Nutrient Removal (BNR) technology with WQIF grant #440-S-98-03. Since the HL Mooney WRF is a BNR facility, the 18 MGD flow tier shall include an Annual Average Total Nitrogen concentration of 8.0 mg/L. This facility is using Water Quality Improvement Funds to upgrade the facility to SOA treatment at 24 MGD. As such, an annual average effluent limitation of 3.0 mg/L for Total Nitrogen and monthly and Year-To-Date calculations are included in this individual permit at the 24 MGD flow tier. The facility's annual Total Nitrogen allocation set forth in 9 VAC 25-720 – *Water Quality Management Plan Regulation* is also based on 3.0 mg/L at 24 MGD.

The annual average limitation for Total Phosphorus was not included in this individual permit. The monthly average TP limit of 0.18 mg/L is based upon the Policy for the Potomac River Embayments, which the general permit does not supersede. It is staff's best professional judgment that this monthly average limit is more stringent than the annual average at the same concentration per the WLA found in 9 VAC 25-720-120-C.

Orthophosphate monitoring shall be removed from this individual permit and shall be reported through the General Permit.

f) Effluent Limitations Policy for the Potomac River Embayments (PPRE), Outfall 001

The PPRE included monthly average effluent limits that apply to all sewage treatment plants:

Parameter	Monthly Average (mg/l)
$cBOD_5$	5
Total Suspended Solids	6.0
Total Phosphorus	0.18
NH_3 (Apr 1 – Oct 31)	1.0

The PPRE states that the “above limitations shall not replace or exclude the discharge from meeting the requirements of the State’s Water Quality Standards (9 VAC 25-260-10 et seq.).” These limits are protective of the criteria for dissolved oxygen.

g) Effluent Limitations and Monitoring Summary.

The effluent limitations are presented in the following tables. Limits were established for Flow, $cBOD_5$, Total Suspended Solids, Ammonia as Nitrogen, pH, Dissolved Oxygen, Total Phosphorus, Total Nitrogen, and *E. coli*. Monitoring is included for TKN, Nitrate+Nitrite, and Toxicity.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/l), with the flow values (in MGD) and a conversion factor of 3.785.

The mass loading (lb/d) for Total Phosphorus monthly and weekly averages were calculated by multiplying the concentration values (mg/l), with the flow values (in MGD) and a conversion factor of 8.3438.

An ammonia loading limit for the summer months is included in the permit because the basis for this limit is PPRE and not the toxic water quality criteria.

Dissolved oxygen (D.O.) has a daily minimum concentration of 6.0 mg/L and is based on original modeling conducted (See Attachment 13) and is set to meet the water quality criteria for D.O. in the receiving stream.

The weekly average concentrations for TSS, Total Phosphorus, and $cBOD_5$ were calculated by using the monthly average concentration and multiplying by a 1.5 multiplier.

The VPDES Permit Regulation at 9 VAC 25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD/CBOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual and 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*.

The facility requested a reduction in the frequency of *E. coli* and CBOD monitoring based on their compliance history. Staff concurs with the request and granted reductions at the 18 MGD flow tier; staff additionally granted a reduction in the TSS monitoring frequency. See Fact Sheet section 21.l. for the 24 MGD monitoring special condition.

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

19. Effluent Limitations/Monitoring Requirements:

Design flow is 18 MGD.
Effective Dates: During the period beginning with the permit's effective date and lasting until the issuance of the CTO for the 24 MGD flow tier or the expiration date, whichever comes first.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$	4	5 mg/L 300 kg/day	8 mg/L 500 kg/day	NA	NA	3D/W	24H-C
Total Suspended Solids (TSS)	4	6.0 mg/L 410 kg/day	9.0 mg/L 610 kg/day	NA	NA	3D/W	24H-C
Dissolved Oxygen	3,5	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	3	NL mg/L	NA	NA	NA	1/W	24H-C
Ammonia, as N (Nov-Jan)	3,5	NL mg/L	NL mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Feb-Mar)	3,5	4.6 mg/L	5.5 mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Apr-Oct)	3,4,5	1.0 mg/L 68 kg/day	4.4 mg/L 300 kg/day	NA	NA	1/D	24H-C
E. coli (Geometric Mean)	3	126 n/100mls	NA	NA	NA	5D/W	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	1/W	24H-C
Total Nitrogen [a.]	3, 6	NL mg/L	NA	NA	NA	1/W	Calculated
Total Nitrogen – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [b.]	3, 6	8.0 mg/L	NA	NA	NA	1/Y	Calculated
Total Phosphorus	4	0.18 mg/L 27 lb/day	0.27 mg/L 41 lb/day	NA	NA	1/D	24H-C
Acute Toxicity – *C. dubia* (TU_a)		NA	NA	NA	NL	1/Y	24H-C
Acute Toxicity – *P. promelas* (TU_a)		NA	NA	NA	NL	1/Y	24H-C
Chronic Toxicity – *C. dubia* (TU_c)		NA	NA	NA	NL	1/Y	24H-C
Chronic Toxicity – *P. promelas* (TU_c)		NA	NA	NA	NL	1/Y	24H-C

The basis for the limitations codes are:
1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards
4. Potomac Embayment Standards
5. Stream Model- Attachment 10
6. 9 VAC 25-40 (Nutrient Regulation)

MGD = Million gallons per day.
N/A = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/M = Once every month.
1/W = Once every week.
3D/W = Three days a week.
5D/W = Five days a week.
1/Y = Once every calendar year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by =10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for the calculation of the Nutrient Calculations.

19. Effluent Limitations/Monitoring Requirements:

Design flow is 24 MGD.
Effective Dates: During the period beginning with the issuance of the CTO for the 24 MGD flow tier and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$ [c.]	4	5 mg/L 400 kg/day	8 mg/L 700 kg/day	NA	NA	1/D	24H-C
Total Suspended Solids (TSS) [c.]	4	6.0 mg/L 540 kg/day	9.0 mg/L 820 kg/day	NA	NA	3D/W	24H-C
Dissolved Oxygen	3,5	NA	NA	6.0 mg/L	NA	3D/W	Grab
Total Kjeldahl Nitrogen (TKN)	3	NL mg/L	NA	NA	NA	3D/W	24H-C
Ammonia, as N (Nov-Jan)	3,5	NL mg/L	NL mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Feb-Mar)	3,5	4.3 mg/L	5.2 mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Apr-Oct)	3,4,5	1.0 mg/L 91 kg/day	4.1 mg/L 372 kg/day	NA	NA	1/D	24H-C
E. coli (Geometric Mean) [c.]	3	126 n/100mls	NA	NA	NA	5D/W	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	3D/W	24H-C
Total Nitrogen [a.]	3, 6	NL mg/L	NA	NA	NA	3D/W	Calculated
Total Nitrogen – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [b.]	3, 6	3.0 mg/L	NA	NA	NA	1/Y	Calculated
Total Phosphorus	4	0.18 mg/L 36 lb/day	0.27 mg/L 54 lb/day	NA	NA	1/D	24H-C
Acute Toxicity – *C. dubia* (TU_a)		NA	NA	NA	NL	1/Y	24H-C
Acute Toxicity – *P. promelas* (TU_a)		NA	NA	NA	NL	1/Y	24H-C
Chronic Toxicity – *C. dubia* (TU_c)		NA	NA	NA	NL	1/Y	24H-C
Chronic Toxicity – *P. promelas* (TU_c)		NA	NA	NA	NL	1/Y	24H-C

The basis for the limitations codes are:
1. Federal Effluent Requirements
2. Best Professional Judgment
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5D/W = Five days a week.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by =10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for the calculation of the Nutrient Calculations.

c. See Section 21.l. The facility shall monitor at the reduced frequencies until the monthly average flow reaches 16 MGD for three (3) consecutive months at the 24 MGD flow tier, then the permittee shall begin daily (1/D) monitoring for $CBOD_5$, TSS, and *E. coli*.

20. Other Permit Requirements :

a) Part I.B. of the permit contains quantification levels and compliance reporting instructions.

9 VAC 25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*. §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9 VAC 25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b) Permit Section Part I.D., details the requirements for Toxics Management Program.

The VPDES Permit Regulation at 9 VAC 25-31-210 requires monitoring and 9 VAC 25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A TMP is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, IWC, and receiving stream characteristics. (See Attachment 11).

c) Permit Section Part I.C., details the requirements of a Pretreatment Program.
The VPDES Permit Regulation at 9 VAC 25-31-210 requires monitoring and 9 VAC 25-31-220.D. requires all discharges to protect water quality. The VPDES Permit Regulation at 9 VAC 25-31-730. through 900., and 40 CFR Part 403 requires POTWs with a design flow of >5 MGD and receiving from Significant Industrial Users (SIUs) pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

This treatment works is a POTW with a design capacity of 18 MGD, with plans for expansion to 24 MGD. Prince William County Service Authority also owns and operates the Occoquan Forest Spray Irrigation Plant (VPA00007). To date, the County's sewer use ordinance and legal authority are approved, but they do not have a final pretreatment program in place because no Significant Industrial Users (SIUs) or Categorical Industrial Users (CIUs) have been identified as discharging to the Mooney WRF. The permit contains a condition requiring a survey of industrial users (contributors) to the POTW. Should categorical or significant industrial users be identified, the permittee shall be required to develop a pretreatment program.

Program requirements and reporting are found in this section of the permit.

d) Sewage Sludge Management Plan, Sludge Monitoring and Additional Reporting Requirements.

The HL Mooney WRF is considered as Class I sludge management facility. The permit regulation (9 VAC 25-31-500) defines a Class I sludge management facility as any POTW which is required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9 VAC 25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment. The Mooney plant incinerates the sludge generated from the wastewater treatment process. Incineration is governed by the regulations of the Air Pollution Control Board. The ash generated from the incinerators is disposed in an approved landfill.

21. Other Special Conditions :

a) 95% Capacity Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.B.2. requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b) Indirect Dischargers. Required by VPDES Permit Regulation, 9 VAC 25-31-280 B.9 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c) O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190.E. Within 90 days of the effective date of this permit, the permittee shall submit for approval an Operations and Maintenance (O&M) Manual or a statement confirming the accuracy and completeness of the current O&M Manual to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO). Future changes to the facility must be addressed by the submittal of a revised O&M Manual within 90 days of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d) CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e) Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9 VAC 25-31-200 D, and Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.

f) Reliability Class. The Sewage Collection and Treatment Regulation at 9 VAC 25-790 requires sewerage works achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. The facility is required to meet a reliability Class of I.

g) Sludge Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.C.4. requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works.

h) Sludge Use and Disposal. The VPDES Permit Regulation at 9 VAC 25-31-100.P., 220.B.2., and 420-720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage.

i) E3/E4. 9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

j) Nutrient Reopener. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

k) PCB Monitoring. This special condition shall require the permittee to monitor and report PCB concentrations in dry weather and wet weather effluent samples. The results from this monitoring shall be used to implement the PCB TMDL that was developed for the Potomac River and approved by EPA in October 2007. This facility was given a WLA in the TMDL.

l) Final Effluent Monitoring Frequency. The Sewage Collection and Treatment Regulations require that a facility with a 24.0 MGD design flow collect conventional and Bacteria samples once a day. DEQ granted monitoring reductions for $CBOD_5$, TSS, and *E. coli* at the 18 MGD tier based on the compliance history of the facility. When the facility's monthly average flow reaches 16 MGD for 3 consecutive months at the 242 MGD flow tier, the facility shall begin daily monitoring for $CBOD_5$, TSS, and *E. coli*. This special condition shall not affect the monitoring frequency of any other parameters. If the facility has any exceedances of the numerical limitations associated with the parameters with the frequency reductions, upon written notification from DEQ, the facility shall increase the frequency of the monitoring to daily for $CBOD_5$, TSS, and *E. coli* for the remaining term of the permit.

22. Permit Section Part II:

Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a) Special Conditions:
   1) A special condition for PCB monitoring was added to the permit based on the TMDL established for the tidal Potomac River.
   2) An E3/E4 special condition was added based on the current nutrient guidance.
   3) A Nutrient reopener was added based on the current nutrient guidance.
   4) The Final Effluent Monitoring Alternative and Water Quality Criteria Reopener special conditions were removed.
   5) The Instream Monitoring special condition was removed since the study has been completed.
   6) A CTC/CTO special condition was added in accordance with the SCAT regulations.
   7) A special condition for reduced monitoring at the 24 MGD flow tier was added. Once the monthly average flows reach a specific flow for three consecutive months, the monitoring shall be increased to daily for the specified parameters.

b) Monitoring and Effluent Limitations:
   1) Chlorine limitations and the associated reporting instructions were removed from the permit during this reissuance since the UV system received a CTO 11/8/05 and chlorine is no longer used for disinfection.
   2) Year to Date monitoring and an Annual Average limits for Total Nitrogen were included with this reissuance at the 18 MGD (8.0 mg/L) and 24 MGD (3.0 mg/L) flow tiers.
   3) Monitoring frequency reductions were allowed at the 18 MGD flow tier for CBOD, TSS, and *E. coli* based on the compliance history of the facility.
   4) The monthly and weekly averages for Total Phosphorus are now expressed as lb/day instead of kg/day.
   5) The ammonia monthly and weekly average limitations for February-March at both flow tiers were revised based on the pH data collected from the instream monitoring.
   6) The ammonia weekly average limitation for April-October at both flow tiers was revised based on the pH and temperature data collected from the instream monitoring.
   7) Orthophosphate monitoring was removed from the permit since it is now reported as part of the Nutrient General Permit.
   8) Nitrate+Nitrite monitoring is included in this reissuance in lieu of separate values for the parameters.

24. Variances/Alternate Limits or Conditions:

The facility was granted monitoring frequency reductions at the 18 MGD flow tier for CBOD, TSS, and *E. coli* based on the compliance history of the facility. The monitoring frequencies were also granted for the 24 MGD flow tier until the monthly average flow reaches 16 MGD for three consecutive months, then the frequency shall be daily.

25. Public Notice Information:

First Public Notice Date: 3/16/09 Second Public Notice Date: 3/23/09

Public Notice Information is required by 9 VAC 25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3834, alison.thompson@deq.virginia.gov. See Attachment 8 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

26. 303 (d) Listed Stream Segments and Total Max. Daily Loads (TMDL):

There is a downstream impairment for the Potomac River and its tidal tributaries, including tidal Neabsco Creek, for PCBs in fish tissue. Upstream facilities were included in the TMDL if they were considered significant sources. The HL Mooney facility was identified as significant source and provided a WLA in the TMDL. The receiving stream is also impaired for *E. coli* a TMDL due in 2016. This facility utilizes ultraviolet disinfection and is required to monitor *E. coli* on a frequent basis. The facility has been meeting its limit and is not believed to be contributing to the impairment. The segment containing the discharge was included in Attachment C (Plaintiff's list of waters that were added to the 303(d) list in 2002) for pH. In 2008, the pH parameter was submitted for delist. This segment was included in Attachment C (Plaintiff's list of waters that were added to the 303(d) list in 2002) for pH. In 2008, the pH parameter, first listed in 2002, was submitted for delist. If delisting is not approved by EPA, TMDL due date is 2010.

TMDL Reopener: This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

27. Additional Comments:

Previous Board Action(s): None.

Staff Comments: This permitting action was delayed due to staff workload and negotiations with PWCSA over the weekly ammonia limits during the April – October monitoring period.

Public Comment: None. Comments were only received from the permittee.

EPA Checklist: The checklist can be found in Attachment 9.

Development of the Policy for the Potomac River Embayments (9 VAC 25-415-10):

The State Water Control Board adopted the Potomac Embayment Standards (PES) in 1971 to address serious nutrient enrichment problems evident in the Virginia embayments and Potomac River at the time. These standards applied to sewage treatment plants discharging into Potomac River embayments in Virginia and for expansions of existing plants discharging into the non-tidal tributaries of these embayments. The standards were actually effluent limitations for BOD, unoxidized nitrogen, total phosphorus, and total nitrogen:

Parameter	PES Standard (monthly average)
BOD_5	3 mg/L
Unoxidized Nitrogen	1 mg/L (April – October)
Total Phosphorus	0.2 mg/L
Total Nitrogen	1 mg/L (when technology is available)

Based upon these standards, several hundred million dollars were spent during the 1970s and 1980s upgrading major treatment plants in the City of Alexandria and the Counties of Arlington, Fairfax, Prince William, and Stafford. Today, these localities operate advanced wastewater treatment plants which have contributed a great deal to the dramatic improvement in the water quality of the upper Potomac estuary.

Before the planned upgrades at these facilities were completed, and the fact that water quality improved, questions arose over the high capital and operating costs that would result from meeting all of the requirements contained in the PES. Questions also arose due to the fact that the PES were blanket effluent limitations that applied equally to different bodies of water. Therefore, in 1978, the State Water Control Board committed to reevaluate the PES. In 1984, a major milestone was reached when the Virginia Institute of Marine Science (VIMS) completed state-of-the-art models for each of the embayments. The Board then selected the Northern Virginia Planning District Commission (NVPDC) to conduct wasteload allocation studies of the Virginia embayments using the VIMS models. In 1988, these studies were completed and effluent limits that would protect the embayments and the mainstem of the Potomac River were developed for each major facility.

Since the PES had not been amended or repealed, VPDES permits had included the PES standards as effluent limits. Since the plants could not meet all of the requirements of the PES, the plant owners operated under consent orders or consent decrees with operating effluent limits for the treatment plants that were agreed upon by the owners and the Board.

In 1991 and 1992, several Northern Virginia jurisdictions with embayment treatment plants submitted a petition to the Board requesting that the Board address the results of the VIMS/NVPDC studies. Their petition requested revised effluent limitations and a defined modeling process for determining effluent limitations.

The recommendations in the petition were designed to protect the extra sensitive nature of the embayments along with the Potomac River which have become a popular recreational resource during recent years. The petition included requirements more stringent than would be applied using the results of the modeling/allocation work conducted in the 1980s. With the inherent uncertainty of modeling, the petitioners question whether the results of modeling would provide sufficient protection for the embayments. By this petition, the local governments asked for continued special protection for the embayments based upon a management approach that uses stringent effluent limits. They believe this approach has proven successful over the past two decades. In addition the petition included a modeling process that will be used to determine if more stringent limits are needed in the future due to increased wastewater discharges.

The State Water Control Board adopted the petition, with revisions, as a regulation on September 12, 1996. The regulation is entitled *Policy for the Potomac River Embayments* (9 VAC25-415-10). On the same date, the Board repealed the old PES. The new regulation became effective on April 3, 1997, and contains the following effluent limits:

Parameter	PES Standard (monthly average)
$cBOD_5$	5 mg/L
TSS	6 mg/L
Total Phosphorus	0.18 mg/L
Ammonia as Nitrogen	1 mg/L (April - October)

9 VAC 25-415-50 Water Quality Monitoring. The Policy says “that water quality models may be required to predict the effects of wastewater discharges on the water quality of the receiving waterbody, the embayment, and the Potomac River. The purpose of the modeling shall be to determine if more stringent limits than those required by 9 VAC 25-415-40 (the Policy’s effluent limitations) are required to meet water quality standards.”

1500 ft Scale: 1 : 50,000 Detail: 12-0 Datum: WGS84

Dissolved Oxygen Criteria (9 VAC 25-260-185)

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
Deep-water	30-day mean >3 mg/L	June 1-September 30
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	
Deep-channel	Instantaneous minimum > 1 mg/L	June 1-September 30

[1]See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF

Permit No.: VA0025101 (April to October)

Receiving Stream: Neabsco Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =		mg/L
90% Temperature (Annual) =		deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =		SU
10% Maximum pH =		SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD
Annual Average =	n/a	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	170	mg/L
90% Temp (Annual) =	30.11	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	8.42	SU
10% Maximum pH =		SU
Discharge Flow =	24	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+03**
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.8E+02**
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	6.6E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+00**
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	3.0E+00	--	na	1.4E-03	--	--	--	--	--	--	--	--	**3.0E+00**	**--**	**na**	**1.4E-03**
Ammonia-N (mg/l) (Yearly)	0	3.74E+00	4.56E-01	na	--	3.7E+00	4.6E-01	na	--	--	--	--	--	--	--	--	--	**3.7E+00**	**4.6E-01**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	3.74E+00	1.25E+00	na	--	3.7E+00	1.2E+00	na	--	--	--	--	--	--	--	--	--	**3.7E+00**	**1.2E+00**	**na**	**--**
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+05**
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+03**
Arsenic	o	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.5E+02**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.1E+02**
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	5.4E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E-03**
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+05**
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+03**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.2E+03**
Cadmium	0	7.1E+00	1.7E+00	na	--	7.1E+00	1.7E+00	na	--	--	--	--	--	--	--	--	--	**7.1E+00**	**1.7E+00**	**na**	**--**
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.4E+01**
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.2E-02	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	**na**	**2.2E-02**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	**--**
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+02**
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+03**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.1E-02**	**na**	**--**
Chromium III	0	8.8E+02	1.1E+02	na	--	8.8E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	**8.8E+02**	**1.1E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	**--**
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Copper	0	2.2E+01	1.4E+01	na	--	2.2E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**2.2E+01**	**1.4E+01**	**na**	**--**
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05	--	--	--	--	--	--	--	--	**2.2E+01**	**5.2E+00**	**na**	**2.2E+05**
DDD [C]	0	--	--	na	8.4E-03	--	--	na	8.4E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.4E-03**
DDE [C]	0	--	--	na	5.9E-03	--	--	na	5.9E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	5.9E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**5.9E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+04**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	7.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-01**
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+02**
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.9E+02**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.9E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.9E+02**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.4E-03	--	--	--	--	--	--	--	--	**2.4E-01**	**5.6E-02**	**na**	**1.4E-03**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	5.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+01**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+03**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+06**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	9.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.1E+01**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**na**
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	5.4E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+02**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-02	3.6E-02	na	8.1E-01	--	--	--	--	--	--	--	--	**8.6E-02**	**3.6E-02**	**na**	**8.1E-01**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+02**
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-02**	**na**	**--**
Heptachlor ^{C}	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**2.1E-03**
Heptachlor Epoxide ^{C}	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**1.1E-03**
Hexachlorobenzene ^{C}	0	--	--	na	7.7E-03	--	--	na	7.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-03**
Hexachlorobutadiene ^{C}	0	--	--	na	5.0E+02	--	--	na	5.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.0E+02**
Hexachlorocyclohexane Alpha-BHC ^{C}	0	--	--	na	1.3E-01	--	--	na	1.3E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E-01**
Hexachlorocyclohexane Beta-BHC ^{C}	0	--	--	na	4.6E-01	--	--	na	4.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E-01**
Hexachlorocyclohexane Gamma-BHC ^{C} (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01	--	na	6.3E-01	--	--	--	--	--	--	--	--	**9.5E-01**	**--**	**na**	**6.3E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
Hexachloroethane ^{C}	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+00**	**na**	**--**
Indeno (1,2,3-cd) pyrene ^{C}	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone ^{C}	0	--	--	na	2.6E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+04**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	2.3E+02	2.7E+01	na	--	2.3E+02	2.7E+01	na	--	--	--	--	--	--	--	--	--	**2.3E+02**	**2.7E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.1E-02	--	--	--	--	--	--	--	--	**1.4E+00**	**7.7E-01**	**na**	**5.1E-02**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.0E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**
Nickel	0	2.9E+02	3.2E+01	na	4.6E+03	2.9E+02	3.2E+01	na	4.6E+03	--	--	--	--	--	--	--	--	**2.9E+02**	**3.2E+01**	**na**	**4.6E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+03**
N-Nitrosodimethylamine ^{C}	0	--	--	na	8.1E+01	--	--	na	8.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+01**
N-Nitrosodiphenylamine ^{C}	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
N-Nitrosodi-n-propylamine ^{C}	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB Total ^{C}	0	--	--	na	1.7E-03	--	--	na	1.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Pentachlorophenol ^{C}	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-03	5.9E-03	na	8.2E+01	--	--	--	--	--	--	--	--	**7.7E-03**	**5.9E-03**	**na**	**8.2E+01**
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+06**
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+01**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+00**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+00**
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+04**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**1.1E+04**
Silver	0	8.6E+00	--	na	--	8.6E+00	--	na	--	--	--	--	--	--	--	--	--	**8.6E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane^{C}	0	--	--	na	1.1E+02	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+02**
Tetrachloroethylene^{C}	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.3E+00**
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E-01	2.0E-04	na	7.5E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**7.5E-03**
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E-01	6.3E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**6.3E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.4E+02**
1,1,2-Trichloroethane^{C}	0	--	--	na	4.2E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+02**
Trichloroethylene ^{C}	0	--	--	na	8.1E+02	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+02**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	6.5E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride^{C}	0	--	--	na	6.1E+01	--	--	na	6.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.1E+01**
Zinc	0	1.8E+02	1.9E+02	na	6.9E+04	1.8E+02	1.9E+02	na	6.9E+04	--	--	--	--	--	--	--	--	**1.8E+02**	**1.9E+02**	**na**	**6.9E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	4.3E+03
Arsenic	9.0E+01
Barium	na
Cadmium	1.0E+00
Chromium III	6.9E+01
Chromium VI	6.4E+00
Copper	8.5E+00
Iron	na
Lead	1.6E+01
Manganese	na
Mercury	5.1E-02
Nickel	1.9E+01
Selenium	3.0E+00
Silver	3.4E+00
Zinc	7.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF Permit No.: VA0025101 (November to January)

Receiving Stream: Neabsco Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =		mg/L
90% Temperature (Annual) =		deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =		SU
10% Maximum pH =		SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	n	

Stream Flows

1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD
Annual Average =	n/a	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	170	mg/L
90% Temp (Annual) =		deg C
90% Temp (Wet season) =	11.6	deg C
90% Maximum pH =	8	SU
10% Maximum pH =		SU
Discharge Flow =	24	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+03**
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.8E+02**
Acrylonitrile[c]	0	--	--	na	6.6E+00	--	--	na	6.6E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+00**
Aldrin [c]	0	3.0E+00	--	na	1.4E-03	3.0E+00	--	na	1.4E-03	--	--	--	--	--	--	--	--	**3.0E+00**	**--**	**na**	**1.4E-03**
Ammonia-N (mg/l) (Yearly)	0	8.41E+00	3.95E+00	na	--	8.4E+00	4.0E+00	na	--	--	--	--	--	--	--	--	--	**8.4E+00**	**4.0E+00**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	8.41E+00	2.94E+00	na	--	8.4E+00	2.9E+00	na	--	--	--	--	--	--	--	--	--	**8.4E+00**	**2.9E+00**	**na**	**--**
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+05**
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+03**
Arsenic	o	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.5E+02**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Benzene [c]	0	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.1E+02**
Benzidine[c]	0	--	--	na	5.4E-03	--	--	na	5.4E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E-03**
Benzo (a) anthracene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (b) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (k) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Benzo (a) pyrene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+05**
Bromoform [c]	0	--	--	na	3.6E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+03**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.2E+03**
Cadmium	0	7.1E+00	1.7E+00	na	--	7.1E+00	1.7E+00	na	--	--	--	--	--	--	--	--	--	**7.1E+00**	**1.7E+00**	**na**	**--**
Carbon Tetrachloride [c]	0	--	--	na	4.4E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.4E+01**
Chlordane [c]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.2E-02	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	**na**	**2.2E-02**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	**--**
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane [C]	0	--	--	na	3.4E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+02**
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+03**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.1E-02**	**na**	**--**
Chromium III	0	8.8E+02	1.1E+02	na	--	8.8E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	**8.8E+02**	**1.1E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	**--**
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Copper	0	2.2E+01	1.4E+01	na	--	2.2E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**2.2E+01**	**1.4E+01**	**na**	**--**
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05	--	--	--	--	--	--	--	--	**2.2E+01**	**5.2E+00**	**na**	**2.2E+05**
DDD [C]	0	--	--	na	8.4E-03	--	--	na	8.4E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.4E-03**
DDE [C]	0	--	--	na	5.9E-03	--	--	na	5.9E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	5.9E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**5.9E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+04**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
3,3-Dichlorobenzidine [C]	0	--	--	na	7.7E-01	--	--	na	7.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-01**
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+02**
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.9E+02**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.9E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane [C]	0	--	--	na	3.9E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.9E+02**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.4E-03	--	--	--	--	--	--	--	--	**2.4E-01**	**5.6E-02**	**na**	**1.4E-03**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	5.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+01**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+03**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+06**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	9.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.1E+01**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**na**
1,2-Diphenylhydrazine [C]	0	--	--	na	5.4E+00	--	--	na	5.4E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+02**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-02	3.6E-02	na	8.1E-01	--	--	--	--	--	--	--	--	**8.6E-02**	**3.6E-02**	**na**	**8.1E-01**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+02**
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-02**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**2.1E-03**
Heptachlor Epoxide [C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**1.1E-03**
Hexachlorobenzene [C]	0	--	--	na	7.7E-03	--	--	na	7.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-03**
Hexachlorobutadiene [C]	0	--	--	na	5.0E+02	--	--	na	5.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.0E+02**
Hexachlorocyclohexane Alpha-BHC [C]	0	--	--	na	1.3E-01	--	--	na	1.3E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E-01**
Hexachlorocyclohexane Beta-BHC [C]	0	--	--	na	4.6E-01	--	--	na	4.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E-01**
Hexachlorocyclohexane Gamma-BHC [C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01	--	na	6.3E-01	--	--	--	--	--	--	--	--	**9.5E-01**	**--**	**na**	**6.3E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
Hexachloroethane [C]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+00**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone [C]	0	--	--	na	2.6E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+04**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	2.3E+02	2.7E+01	na	--	2.3E+02	2.7E+01	na	--	--	--	--	--	--	--	--	--	**2.3E+02**	**2.7E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.1E-02	--	--	--	--	--	--	--	--	**1.4E+00**	**7.7E-01**	**na**	**5.1E-02**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.0E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**
Nickel	0	2.9E+02	3.2E+01	na	4.6E+03	2.9E+02	3.2E+01	na	4.6E+03	--	--	--	--	--	--	--	--	**2.9E+02**	**3.2E+01**	**na**	**4.6E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+03**
N-Nitrosodimethylamine [C]	0	--	--	na	8.1E+01	--	--	na	8.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+01**
N-Nitrosodiphenylamine [C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
N-Nitrosodi-n-propylamine [C]	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB Total [C]	0	--	--	na	1.7E-03	--	--	na	1.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-03	5.9E-03	na	8.2E+01	--	--	--	--	--	--	--	--	**7.7E-03**	**5.9E-03**	**na**	**8.2E+01**
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+06**
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+01**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+00**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+00**
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+04**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**1.1E+04**
Silver	0	8.6E+00	--	na	--	8.6E+00	--	na	--	--	--	--	--	--	--	--	--	**8.6E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	1.1E+02	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+02**
Tetrachloroethylene[C]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.3E+00**
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E-01	2.0E-04	na	7.5E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**7.5E-03**
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E-01	6.3E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**6.3E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.4E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	4.2E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+02**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	6.1E+01	--	--	na	6.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.1E+01**
Zinc	0	1.8E+02	1.9E+02	na	6.9E+04	1.8E+02	1.9E+02	na	6.9E+04	--	--	--	--	--	--	--	--	**1.8E+02**	**1.9E+02**	**na**	**6.9E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	4.3E+03
Arsenic	9.0E+01
Barium	na
Cadmium	1.0E+00
Chromium III	6.9E+01
Chromium VI	6.4E+00
Copper	8.5E+00
Iron	na
Lead	1.6E+01
Manganese	na
Mercury	5.1E-02
Nickel	1.9E+01
Selenium	3.0E+00
Silver	3.4E+00
Zinc	7.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF Permit No.: VA0025101 (February to March)

Receiving Stream: Neabsco Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		
Mean Hardness (as CaCO3) =		mg/L
90% Temperature (Annual) =		deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =		SU
10% Maximum pH =		SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows		
1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD
Annual Average =	n/a	MGD

Mixing Information		
Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information		
Mean Hardness (as CaCO3) =	170	mg/L
90% Temp (Annual) =		deg C
90% Temp (Wet season) =	10.4	deg C
90% Maximum pH =	8.42	SU
10% Maximum pH =		SU
Discharge Flow =	24	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+02	--	--	--	--	--	--	--	--	--	--	na	7.8E+02
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	6.6E+00	--	--	--	--	--	--	--	--	--	--	na	6.6E+00
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	3.0E+00	--	na	1.4E-03	--	--	--	--	--	--	--	--	3.0E+00	--	na	1.4E-03
Ammonia-N (mg/l) (Yearly)	0	3.74E+00	1.25E+00	na	--	3.7E+00	1.2E+00	na	--	--	--	--	--	--	--	--	--	3.7E+00	1.2E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	3.74E+00	1.25E+00	na	--	3.7E+00	1.2E+00	na	--	--	--	--	--	--	--	--	--	3.7E+00	1.2E+00	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	--	--	na	4.3E+03
Arsenic	o	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	--	--	na	7.1E+02
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	5.4E-03	--	--	--	--	--	--	--	--	--	--	na	5.4E-03
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	--	--	na	1.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	--	--	na	3.6E+03
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+03	--	--	--	--	--	--	--	--	--	--	na	5.2E+03
Cadmium	0	7.1E+00	1.7E+00	na	--	7.1E+00	1.7E+00	na	--	--	--	--	--	--	--	--	--	7.1E+00	1.7E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	--	--	na	4.4E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.2E-02	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	2.2E-02
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+02**
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+03**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.1E-02**	**na**	**--**
Chromium III	0	8.8E+02	1.1E+02	na	--	8.8E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	**8.8E+02**	**1.1E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	**--**
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Copper	0	2.2E+01	1.4E+01	na	--	2.2E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**2.2E+01**	**1.4E+01**	**na**	**--**
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05	--	--	--	--	--	--	--	--	**2.2E+01**	**5.2E+00**	**na**	**2.2E+05**
DDD [C]	0	--	--	na	8.4E-03	--	--	na	8.4E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.4E-03**
DDE [C]	0	--	--	na	5.9E-03	--	--	na	5.9E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	5.9E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**5.9E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+04**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	7.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-01**
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+02**
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.9E+02**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.9E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.9E+02**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.4E-03	--	--	--	--	--	--	--	--	**2.4E-01**	**5.6E-02**	**na**	**1.4E-03**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	5.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+01**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+03**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+06**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	9.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.1E+01**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**na**
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	5.4E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**2.4E+02**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+02**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-02	3.6E-02	na	8.1E-01	--	--	--	--	--	--	--	--	**8.6E-02**	**3.6E-02**	**na**	**8.1E-01**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+04**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+02**
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-02**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**2.1E-03**
Heptachlor Epoxide [C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.1E-03	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**1.1E-03**
Hexachlorobenzene [C]	0	--	--	na	7.7E-03	--	--	na	7.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-03**
Hexachlorobutadiene [C]	0	--	--	na	5.0E+02	--	--	na	5.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.0E+02**
Hexachlorocyclohexane Alpha-BHC [C]	0	--	--	na	1.3E-01	--	--	na	1.3E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E-01**
Hexachlorocyclohexane Beta-BHC [C]	0	--	--	na	4.6E-01	--	--	na	4.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E-01**
Hexachlorocyclohexane Gamma-BHC [C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01	--	na	6.3E-01	--	--	--	--	--	--	--	--	**9.5E-01**	**--**	**na**	**6.3E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
Hexachloroethane [C]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+00**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone [C]	0	--	--	na	2.6E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+04**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	2.3E+02	2.7E+01	na	--	2.3E+02	2.7E+01	na	--	--	--	--	--	--	--	--	--	**2.3E+02**	**2.7E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.1E-02	--	--	--	--	--	--	--	--	**1.4E+00**	**7.7E-01**	**na**	**5.1E-02**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.0E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**
Nickel	0	2.9E+02	3.2E+01	na	4.6E+03	2.9E+02	3.2E+01	na	4.6E+03	--	--	--	--	--	--	--	--	**2.9E+02**	**3.2E+01**	**na**	**4.6E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+03**
N-Nitrosodimethylamine [C]	0	--	--	na	8.1E+01	--	--	na	8.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+01**
N-Nitrosodiphenylamine [C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
N-Nitrosodi-n-propylamine [C]	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+01**
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**--**
PCB Total [C]	0	--	--	na	1.7E-03	--	--	na	1.7E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol C	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-03	5.9E-03	na	8.2E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	8.2E+01
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+06	--	--	--	--	--	--	--	--	--	--	na	4.6E+06
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	--	--	na	1.5E+01
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	--	--	na	4.0E+00
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+00	--	--	--	--	--	--	--	--	--	--	na	8.0E+00
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04	--	--	--	--	--	--	--	--	2.0E+01	5.0E+00	na	1.1E+04
Silver	0	8.6E+00	--	na	--	8.6E+00	--	na	--	--	--	--	--	--	--	--	--	8.6E+00	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane C	0	--	--	na	1.1E+02	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	--	--	na	1.1E+02
Tetrachloroethylene C	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+00	--	--	--	--	--	--	--	--	--	--	na	6.3E+00
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene C	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E-01	2.0E-04	na	7.5E-03	--	--	--	--	--	--	--	--	7.3E-01	2.0E-04	na	7.5E-03
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E-01	6.3E-02	na	--	--	--	--	--	--	--	--	--	4.6E-01	6.3E-02	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+02	--	--	--	--	--	--	--	--	--	--	na	9.4E+02
1,1,2-Trichloroethane C	0	--	--	na	4.2E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	--	--	na	4.2E+02
Trichloroethylene C	0	--	--	na	8.1E+02	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	--	--	na	8.1E+02
2,4,6-Trichlorophenol C	0	--	--	na	6.5E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride C	0	--	--	na	6.1E+01	--	--	na	6.1E+01	--	--	--	--	--	--	--	--	--	--	na	6.1E+01
Zinc	0	1.8E+02	1.9E+02	na	6.9E+04	1.8E+02	1.9E+02	na	6.9E+04	--	--	--	--	--	--	--	--	1.8E+02	1.9E+02	na	6.9E+04

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

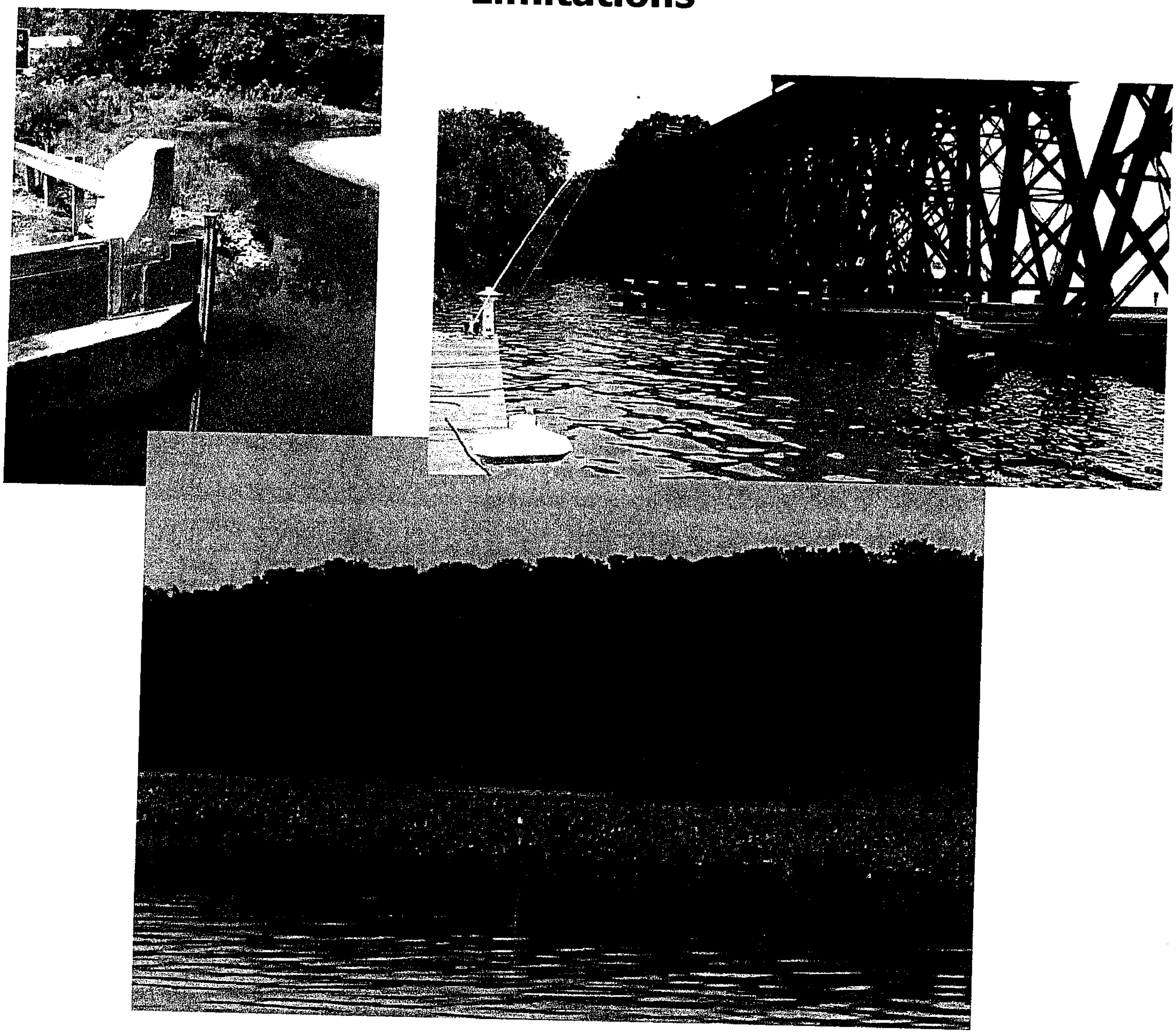
Metal	Target Value (SSTV)
Antimony	4.3E+03
Arsenic	9.0E+01
Barium	na
Cadmium	1.0E+00
Chromium III	6.9E+01
Chromium VI	6.4E+00
Copper	8.5E+00
Iron	na
Lead	1.6E+01
Manganese	na
Mercury	5.1E-02
Nickel	1.9E+01
Selenium	3.0E+00
Silver	3.4E+00
Zinc	7.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Prince William County Service Authority
H.L. Mooney Water Reclamation Facility

VPDES Permit No. VA0025101

In-Stream Monitoring Report For the Evaluation of Ammonia Effluent Limitations



GREELEY AND HANSEN

Prince William County Service Authority
H.L. Mooney Water Reclamation Facility
VPDES Permit No. VA0025101

In-Stream Monitoring Report
For the Evaluation of Ammonia Effluent Limitations

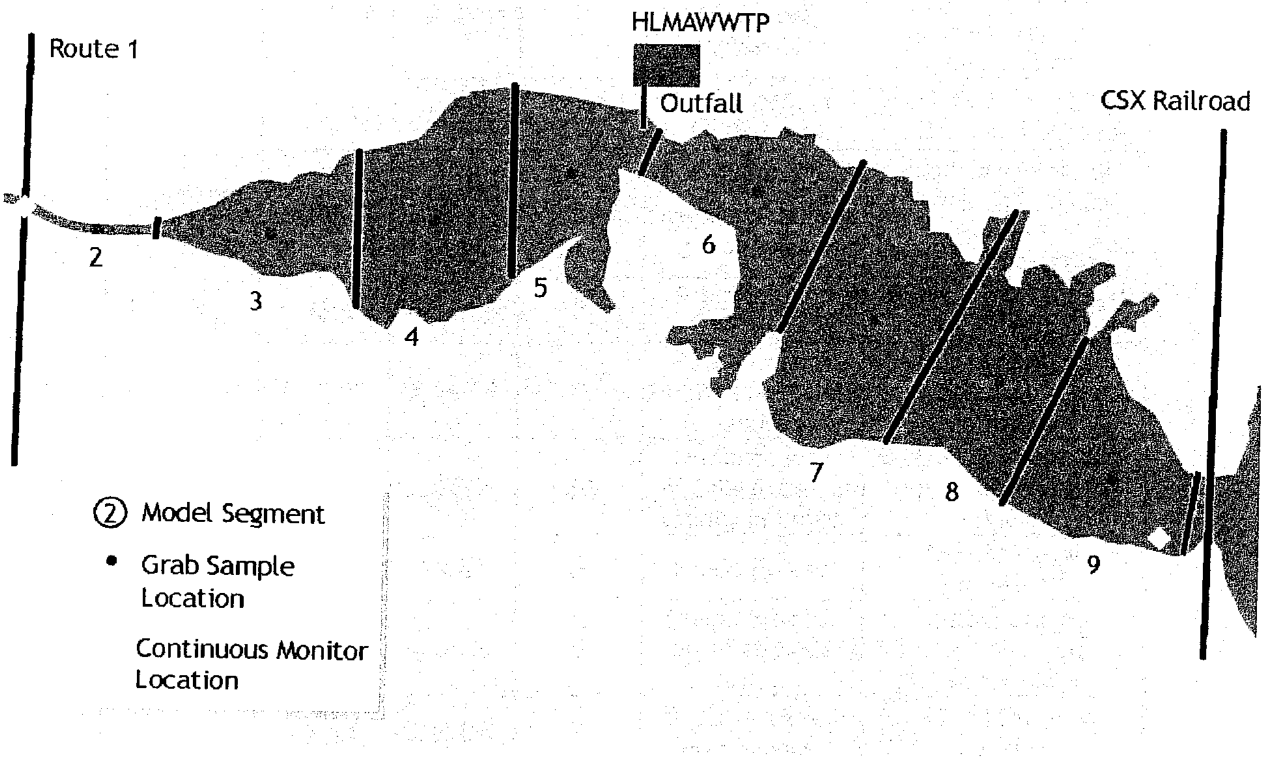
Greeley and Hansen LLC
December 1, 2005

1.0 Introduction

The Prince William County Service Authority (Service Authority) owns and operates the H.L. Mooney Water Reclamation Facility (Mooney WRF, plant). The plant discharges treated effluent to Neabsco Creek, a tributary of the Potomac River. On October 15, 2003, the Virginia Department of Environmental Quality (VDEQ) reissued the VPDES Permit for the Mooney WRF (2003 permit). The 2003 permit includes effluent limitations for ammonia based on a limited data set from grab samples taken sporadically over a period of several years. Part I.E.11 of the permit calls for instream monitoring for temperature and pH in Neabsco Creek to confirm the 2003 ammonia limits. Previously, the Service Authority utilized the Neabsco Creek Embayment Model developed by the Virginia Institute of Marine Science (VIMS model) to assist in the development of permit limits; this model was updated and used again for this analysis.

As called for in the VPDES Permit, the Service Authority has conducted the in-stream monitoring study to assist in determining waste load allocations for Neabsco Creek and discharge limits for the Mooney WRF. The instream sampling plan consists of taking twice-monthly grab samples from eight segments matching those of the VIMS model. Four of the segments are upstream of the plant, representing water quality before the Mooney WRF, and four locations are downstream of the plant, representing water quality after the addition of the Mooney WRF effluent. These sampling locations are shown in Figure 1. GPS was used to assure grab samples were taken in the same locations throughout the sampling program. In addition to the biweekly grab-samples, the approved sampling plan called for two continuous monitors to be installed in Neabsco Creek. One located at the Route 1 Bridge upstream of the plant (upstream probe) and one at the CSX Railroad Bridge near the confluence of Neabsco Creek with Neabsco Bay and the Potomac River (downstream probe). After extensive negotiations with CSX and an adjacent marina, the location of the downstream probe was changed from the CSX Bridge to a marina pier as discussed in the *Preliminary Monitoring Report* issued to VDEQ in April 2005. The Instream monitoring was originally scheduled to begin in June 15, 2004 and end February 15, 2005. However, due to the extensive negotiations concerning locations of the probes and other complications, this sampling period was adjusted to November 17, 2004 though September 30, 2005 with VDEQ consent.

Figure 1: Neabsco Creek Sampling Locations



2.0 Sampling Results

During the sampling period gaps and anomalies in the data and sampling procedures were noted and corrective action was taken. Data were recorded, tracked and graphed and efforts were made to understand and explain unexpected results. These are discussed below.

2.1 Sampling Anomalies

During any extended sampling period anomalies and gaps in data due to equipment outages, weather or other uncontrollable events are to be expected. Several such events were experienced during this sampling program and are outlined below. As problems arose, solutions were developed which aimed to prevent a repetition of the same problem. Table 1 below provides a summary of the sampling anomalies that were experienced during this project. The table shows anomalies and gaps in the continuous monitoring probes that lasted for at least one calendar day. There were gaps in the data which last less than one day, these smaller gaps typically represent the times that the probes' data were being downloaded or during which routine maintenance was being performed.

Table 1– Sampling Gaps in Continuous Monitoring Probes

Probe	Start Date	End Date	Days	Reason for Problem	Solution
Upstream	11/20/04	11/30/04	11	Probe failure during long deployment	Decrease interval between probe maintenance and calibration
	1/22/05	2/16/05	26	Probe Failure: no readings	Purchased new probe + 2 backup probes
	3/18/05	3/30/05	13	Flooding upstream caused probe failure	Wait for waters to recede and replace probe - Data Discarded
	4/6/05	4/12/05	7	Programming Error	Reprogrammed and redeployed
	4/13/05	4/18/05	6	Power Failure: Premature battery failure	Start changing batteries on a regular schedule
Downstream	12/3/04	12/28/04	26	Neabsco was partially frozen in vicinity of probe	Ultimately probe was moved from post to dock
	3/31/05	4/4/05	5	Probe Failure	Maintenance Performed
	4/9/05	4/14/05	6	Power Failure: Premature battery failure	Start changing batteries on a regular schedule
	8/10/05	8/16/05	7	Probe Failure: no readings	Replaced Probe with backup

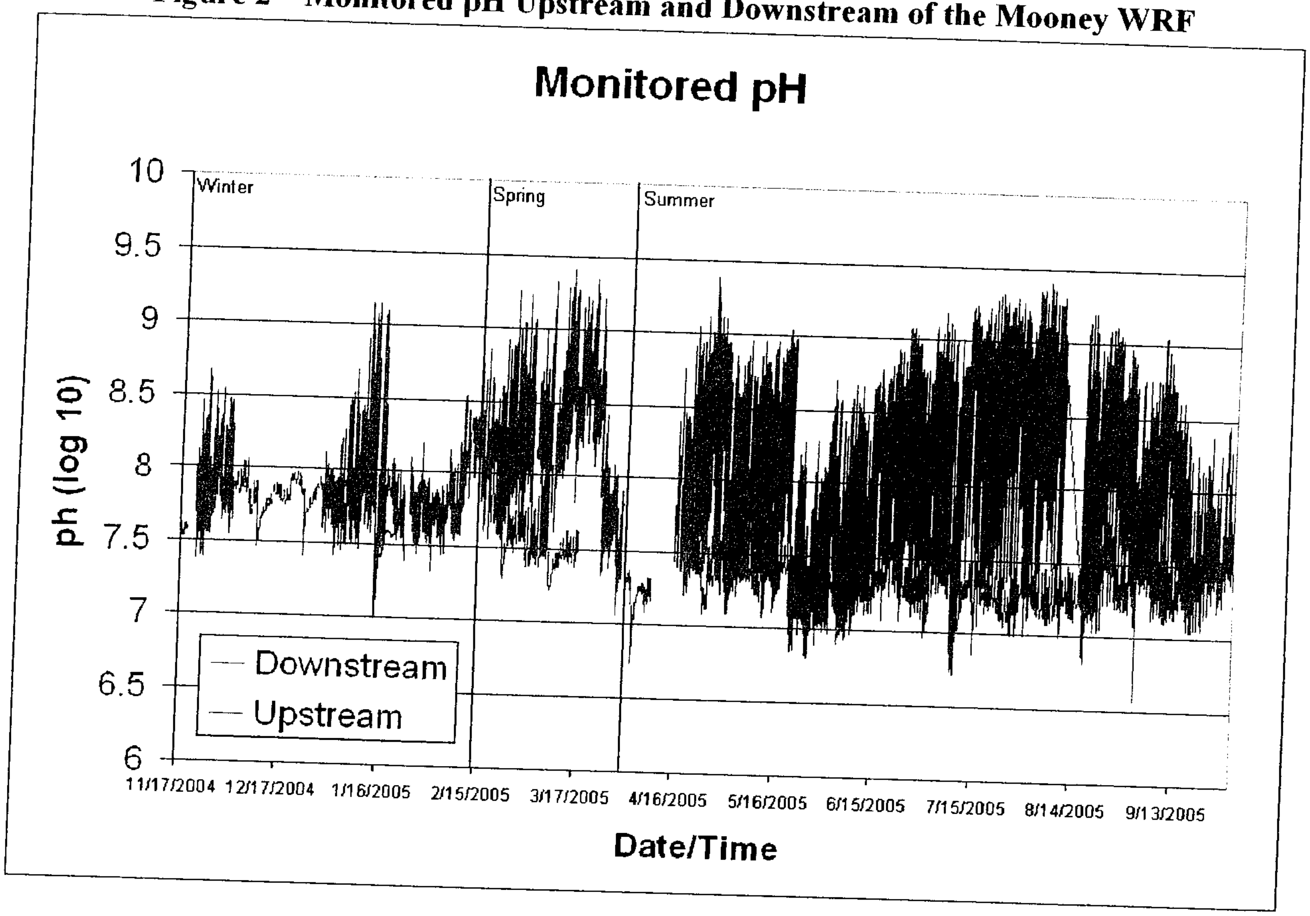
Anomalies or gaps in the data were also present in the grab samples; these typically were a result of access issues to a specific stream-segment. There were times when due to frozen conditions, low tide or very extensive vegetation not all segments could be sampled. The impact of these data gaps is minimal due to the other data that were collected.

The final anomaly that requires discussion is one of sampling time steps. As with all continuous meters these were not truly "continuous" but rather took readings at a prescribed time step. The most common time step throughout the sampling period was one hour, however there are periods during which data were collected at three minute, thirty minute and two hour intervals. During the data analysis it was necessary to have a uniform time step throughout the data record so that averages and percentiles could be calculated correctly. The data were normalized to a two-hour time step (the largest time step). This was done by removing data from time steps that were smaller than two hours; for instance if 30-minute readings were taken at 12:00, 12:30, 1:00, 1:30, and 2:00 then only the reading from 12:00 and 2:00 were used for the analysis. The removal of data was based strictly on the time it was taken, not on the values of pH or temperature recorded during the step.

2.2 pH Results

The pH was monitored upstream and downstream of the plant using continuous monitoring probes as described above. The results of this monitoring are shown in Figure 2 below. The pH was found to be highly variable at the downstream location, where Neabsco Creek meets the Potomac River. It was not uncommon to see pH swings of greater than one standard unit in a single day. An analysis was conducted correlating the pH with the tides and it was found that the high pH readings were coming in from the Potomac River rather then out from Neabsco Creek. In order words, the high pH readings were seen during or just after a high tide. This correlation was seen in other area waterbodies upstream and downstream of Neabsco Creek on the Potomac River. Relatively stable pH values were recorded in the upstream portion of Neabsco Creek which has a much lower tidal influence.

Figure 2 – Monitored pH Upstream and Downstream of the Mooney WRF

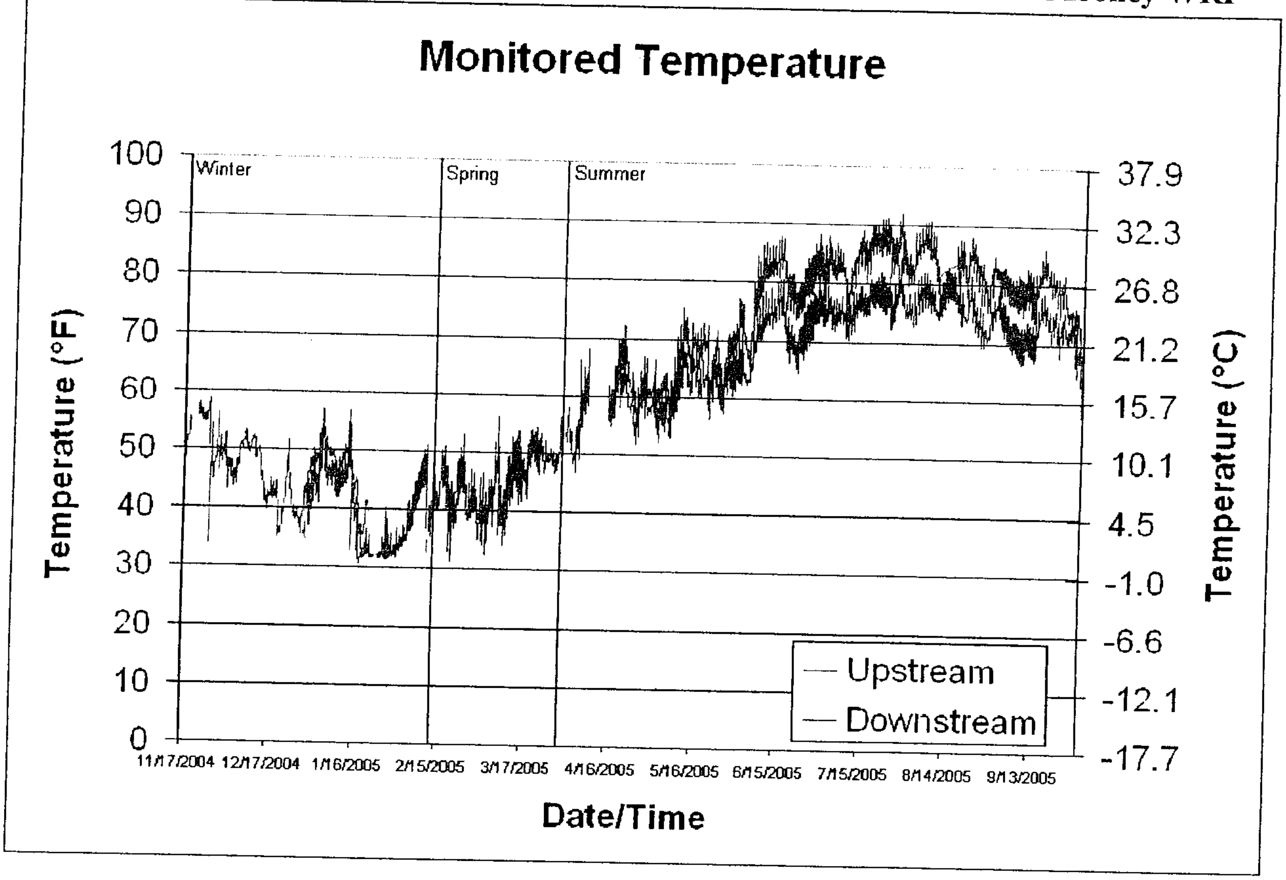


Virginia Water Quality Standards (VWQS) require that state waters (Class I-VI) maintain a pH between 6 and 9 (9 VAC 25-260-50). The 90th percentile pH at the downstream monitoring location is 8.93 for the entire monitored period. The unexpectedly high pH in the Potomac is a driving factor for lower Ammonia Wasteload allocations and permit limits, as will be discussed later in this report. A pH TMDL is currently under development for waters of the Potomac. It is the expectation of the Service Authority that once this TMDL is implemented, Ammonia permit relief may be considered, due to the correlation between pH and ammonia toxicity.

2.3 Temperature Results

Temperature was found to be much less variable than pH. The data show a trend reflective of the seasonal air temperature. Neabsco Creek, a relatively shallow waterbody, experienced especially high temperatures during summer months. Downstream temperatures above 90°F were recorded for a number of days in July and August. The 90th percentile temperature for these summer data is 30°C. Refer to Figure 3 below.

Figure 3 – Monitored Temperature Upstream and Downstream of the Mooney WRF



2.4 Grab Sample Results

In addition to the continuous pH and temperature results presented in the above graphs, grab samples were collected every two weeks at the locations indicated in Figure 1. These grab sample data were used to confirm the VIMS model results. Grab sample data are included in the appendix of this report.

3.0 Data Analysis

H.L. Mooney's current permit is based on a very limited data set collected primarily during daylight hours. As such, the permit uses a number of statistical assumptions as proxies to some of the criteria. Due to the expanded data set collected under this sampling program it is possible to develop a site-specific approach that does not rely on proxy-data. This approach and its results are outlined below.

3.1 Instream Chronic Criteria

Chronic Toxicity as defined by VWQS:

(9 VAC 25-260-140) "Chronic toxicity" means an adverse effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

This criterion is further defined as:

(9 VAC 25-260-155b) The thirty-day average concentration of total ammonia nitrogen (in mg N/L) where early life stages of fish are present in freshwater shall not exceed, more than once every three years on the average2, the chronic criteria below:

$$ChronicCriteriaConcentration = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) \times MIN$$

Where MIN = 2.85 or $1.45 \times 10^{0.028(25-T)}$, whichever is less.
T = temperature in °C

(9 VAC 25-260-155c) thirty-day average concentration of total ammonia nitrogen (in mg N/L) where early life stages of fish are absent (procedures for making this determination are in subdivisions1 through 4 of this subsection), in freshwater shall not exceed, more than once every three years on the average3, the chronic criteria below:

$$ChronicCriteriaConcentration = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) \times 1.45\left(10^{0.028(25-MAX)}\right)$$

MAX = temperature in °C or 7, whichever is greater.

3.1.1 Thirty Day Averages

During the previous permit cycle it was not possible to calculate thirty-day criteria as required by Virginia Water Quality Standards. Therefore as a surrogate to the thirty-day values, the 50th percentile temperature and pH values were used to calculate the instream criteria.

As a result of the continuous monitoring that was conducted under this sampling program it was possible to calculate thirty-day average concentrations. The procedure used was as follows; first instantaneous criteria were calculated for each of the time steps in the downstream data record based on the formulas provided in VWQS (above). Second three possible alternatives were considered when calculating the thirty-day criteria:

a) a thirty-day rolling average that included the current day and the previous 30 (30bck)
b) a thirty-day rolling average that included the current day then the next 30 (30fwd)
c) a thirty-day rolling average that included the current day, previous 15 and next 15 days (+/-15)

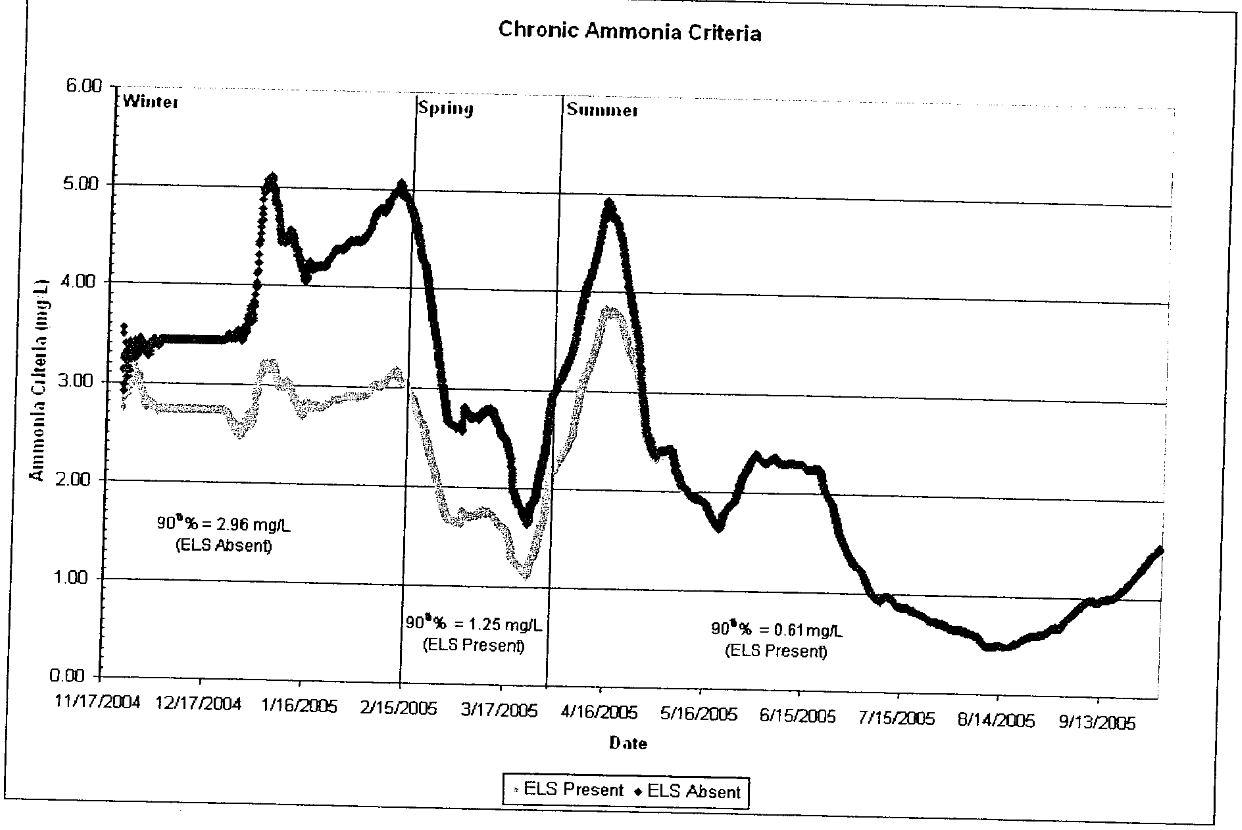
Next, the 90th percentile[1] values were calculated for each of the permit periods (winter, spring and summer) and for each of the thirty-day average alternatives (30bck, 30fwd, +/-15days). This procedure was conducted for both the Early Life Stages (ELS) present and absent status. Finally, *the most conservative value for each permit period was chosen as the instream chronic criteria for that permit period, based on the ELS classification.* The results are show in Table 2 below.

Table 2: 90th Percentile Chronic Criteria

Season/Permit Period	Criteria (mg/L)
Winter (November 1-February 14)	2.96
Spring (February 15- March 31)	1.25
Summer (April 1 - October 31)	0.61

For the winter period the most conservative value for instream chronic criteria was found using the 30fwd option. For the spring and summer periods the most conservative values were found using the 30bck option. Figure 4 below shows the calculated criteria for ELS present and absent based on the 30bck option.

Figure 4 – Thirty-day Instream Chronic Ammonia Criteria for Neabsco Creek



[1] Throughout this report when referring to ammonia criteria, "90th percentile" actually refers to the 10th percentile of data since the lower values are of interest.

3.2 Instream Acute Criteria

Acute Toxicity is defined by VWQS as:

(9 VAC 25-260-140) "Acute toxicity" means an adverse effect that usually occurs shortly after exposure to a pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not easily detected, immobilization is considered equivalent to death.

This criterion is further defined as:

(9 VAC 25-260-155) The one-hour average concentration of total ammonia nitrogen (in mg N/L) in freshwater shall not exceed, more than once every three years on the average, the acute criteria below [Trout absent]:

$$AcuteCriterionConcentration = \left(\frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}} \right)$$

The acute criteria must be applied to the segments of Neabsco Creek immediately surrounding the outfall (segments 5 extending to segment 6 in the VIMS model) as this is the location that ammonia concentrations will be the highest due to less dilution. It was therefore necessary to determine the pH in this area to calculate the criteria. The VIMS model, a steady state, hydrogen ion based mixing model allowed the pH to be calculated at the various creek-segments based on the 90th percentile pH of the up and downstream continuous monitors and the 99th percentile of the plant effluent pH. The computed values for segment 6 were used to calculate the instream acute criteria.

Based on the VIMS model runs the 90th percentile acute criteria for the specified permit periods is as follows.

Table 3: 90th Percentile Acute Criteria

	Criteria (mg/L)	
Season/Permit Period	18 MGD	24 MGD
Winter (November 1-February 14)	15.96	18.15
Spring (February 15- March 31)	15.19	17.31
Summer (April 1 - October 31)	14.44	16.49

The instream criteria in segment six in large part reflected the relative low pH values present in the plant effluent. Plant effluent data from January 2001 through September 2005 indicates that the 99th percentile pH for plant effluent is 7.3.

3.3 Wasteload Allocations

Wasteload allocations (WLAs) are determined by multiplying instream criteria by a dilution/decay factor. A site-specific dilution factor has been calculated for chronic wasteload allocations at Neabsco Creek. A default dilution value of 2:1 is used for acute wasteload allocations based on the fact that the acute criteria are defined as one half of the final acute value for a specific toxic pollutant. Decay is then applied on top of the dilution factors to develop the dilution/decay factor.

The 2003 permit recognizes and incorporates a site-specific dilution and decay study conducted by Greeley and Hansen in 1997 titled *Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L Mooney Wastewater Treatment Plant* (1997 study). The current evaluation used this study as the basis for developing revised dilution/decay coefficients for the spring and winter permit periods (November 1 through March 31).

The 2003 permit states "Staff's opinion is that nitrification in ambient waters is negligible when temperature is ≤ 10°C." (Fact Sheet page 7). Based on this, decay was not considered during the winter and spring permit periods. The 90th percentile temperature for spring data collected at the downstream probe for this period was 10.4°C. During the winter period the 90th percentile temperature was found to be 11.6°C. These temperatures were applied to the formulas presented in the 1997 study, resulting in the chronic dilution/decay factors shown in Table 4 below.

Table 4 - Calculated Chronic Dilution/Decay Factors

Season/Permit Period	Temperature (90th% - °C)	18 MGD IWC	18 MGD Dilution/Delay Factor	24 MGD IWC	24 MGD Dilution/Delay Factor
Winter (November 1-February 14)	11.6	24.94%	4.01	26.60%	3.76
Spring (February 15- March 31)	10.4	25.91%	3.86	27.70%	3.61
Summer (April 1 - October 31)*	30.11	18.90%	5.29	20.16%	4.96

*Dilution/Decay Factor from 2003 Permit

WLAs were calculated applying the dilution/decay factors to the instream criteria. The results are presented below in Table 5.

Table 5 - Calculated Wasteload Allocations (mg/L) for 18 and 24 MGD

Season/Permit Period	18 MGD Acute WLA	18 MGD Chronic WLA	24 MGD Acute WLA	24 MGD Chronic WLA
Winter (November 1-February 14)	31.92	11.86	36.29	11.12
Spring (February 15- March 31)	30.38	4.83	34.61	4.52
Summer (April 1 - October 31)	28.88	3.26	32.98	3.05

3.4 Proposed Discharge Limits

Using Version 2.0.4 of the Stats program (WLA.EXE) and the ammonia protocol detailed in Guidance Memo 00-2011, permit limits for the Mooney WRF were calculated from the WLA values. The 1.0 summer limit is required under the Potomac Embayment Standards. The water quality based standards are shown adjacent to the 1.0 requirement. Based on these analyses the proposed permit limits are presented in Table 6 below.

Table 6 – Proposed Permit Limits

	18 MGD		24 MGD	
Season/Permit Period	Weekly Limit	Monthly Limit	Weekly Limit	Monthly Limit
Winter (November 1-February 14)	NL	NL	NL	NL
Spring (February 15- March 31)	5.8	4.8	5.4	4.5
Summer (April 1 - October 31)	3.9	3.3 / 1.0	3.7	3.1 / 1.0

4.0 Conclusion

The sampling conducted under this program allowed the Prince William County Service Authority to collect sufficient data to develop site-specific permit limits. Under the 2003 permit this was not possible due to the limited nature of the data record. The nearly 10 months of continuous monitoring and biweekly grab samples allowed valid thirty-day chronic criteria to be computed and the VIMS model results to be confirmed. Additionally, the newly expanded data set, which included "around the clock" data (rather than those only collected during warmer day-light periods) allowed for the calculation of revised decay rates that we believe more accurately reflect rates throughout the calendar year and across permit periods.

The newly proposed permit limits are slightly more stringent that the 2003 permit limits but reflect a more scientifically based approach than was possible under the previous permit.

Appendix A: Neabsco Creek Grab Sample Data

Date	Temperature by Segment (°C)						
	2	4	5	6	7	8	9
09/14/04	22.2					25.2	25.4
09/23/04	19.3					20.7	20.9
09/30/04	19.9	21.8	21.8	21.6	22.3	21.9	21.9
10/21/04	15.0	15.3	15.2	14.8	14.6	14.5	14.5
10/28/04	13.6	14.0	14.9	14.3	14.3	14.3	14.1
11/16/04	9.9	11.4	12.5	9.0	8.9	9.2	9.0
12/02/04	8.3	8.1	10.0	14.6	11.0	9.0	7.9
12/14/04	5.6					5.6	6.3
01/26/05	4.3	3.3	4.7	6.9	1.2	0.5	0.3
04/11/05	15.3	16.4	16.4	16.6	17.0	17.3	16.8
05/26/05	14.9	16.0	16.4	16.2	16.3	16.6	16.5
06/01/05	17.3					21.1	20.9
06/23/05	21.7	23.4	23.1	23.6	24.1	26.2	25.4
07/05/05	23.7	26.6	26.2	26.8	26.8	27.4	27.8
07/21/05	25.5	27.1	27.8	28.1	28.1	29.6	30.6
08/11/05	24.4	25.5	26.1	26.9	28.1	28.7	29.1
08/22/05	24.2	27.2	27.6	28.1	28.3	28.9	28.8
09/06/05	21.1	24.3	24.8	24.7	24.7	25.1	25.1
09/21/05	22.1	23.4	23.9	23.8	24.2	25.2	25.2

Date	pH by Segment (standard units)						
	2	4	5	6	7	8	9
09/14/04	7.8					7.4	7.8
09/30/04	7.1	7.0	7.4	7.8	7.9	7.9	8.0
10/21/04	7.3	7.2	7.3	7.2	7.3	7.5	7.5
10/28/04	7.2	7.6	7.5	7.8	7.7	7.8	7.8
11/16/04	6.9	7.2	7.1	6.9	7.0	7.1	7.3
12/02/04	8.0	7.1	7.6	7.8	7.7	7.2	7.3
12/14/04	7.5					7.3	7.5
01/26/05	7.0	6.8	7.1	7.5	7.2	7.1	7.1
04/11/05	7.4	7.1	7.2	7.2	6.9	7.8	7.6
05/26/05	8.3	8.0	7.9	7.9	7.8	8.1	7.9
06/01/05	8.4					7.6	7.6
06/23/05	7.8	7.8	7.7	7.8	8.0	9.1	9.2
07/05/05	7.4	7.4	7.5	7.6	7.6	7.7	8.2
07/21/05	8.0	7.5	7.5	7.6	7.6	7.9	9.0
08/11/05	7.8	7.6	7.4	7.5	8.0	9.1	9.4
08/22/05	8.2	7.9	8.1	8.4	8.6	9.0	9.1
09/06/05	7.1	7.5	7.6	7.8	8.1	8.8	8.9
09/21/05	7.8	7.6	7.4	7.4	7.4	7.6	7.6

Note: Due to tidal conditions, some segments cannot be reached at all times. Therefore, there will be some blanks for segments 4 to 7.

Glenn Harvey
Prince William County Service Authority
4 County Complex Court
Raymond Spittle Building
Woodbridge, VA 22192

April 15, 2008

**Re: Calculation of Proposed Ammonia Limits for H.L. Mooney Water Reclamation Facility
VPDES Permit No. VA0025101**

Dear Mr. Harvey:

In accordance with your request, we have re-calculated the appropriate ammonia criteria, wasteload allocations, and proposed permit limits for the H.L. Mooney Water Reclamation Facility based on the following Seasons / Permit Periods:

Winter (Nov 1 - Jan 31)
Spring (Feb 1 - Mar 31)
Summer (April 1 - Oct 31)

The prior report on this topic, *Instream Monitoring Report for the Evaluation of Ammonia Effluent Limitations, 2005* used a Feb 15 date for the break between Winter and Spring permit periods.

The change in permit period results in small changes to the criteria, wasteload allocations and permit limit calculations in several tables in the report. Below are shown Tables 5 and 6, which detail, the Calculated Wasteload Allocations and the Proposed Permit Limits.

Table 5: Calculated Wasteload Allocations (mg/L) for 18 and 24 MGD

	18 MGD		24 MGD	
Season/ Permit Period	Acute WLA	Chronic WLA	Acute WLA	Chronic WLA
Winter (Nov 1 - Jan 31)	31.92	13.55	36.30	12.71
Spring (Feb 1 - Mar 31)	30.38	4.90	34.62	4.58
Summer (April 1 - Oct 31)	28.88	3.23	32.98	3.03

Table 6: Proposed Permit Limits

	18 MGD		24 MGD	
Season/ Permit Period	Weekly Limit	Monthly Limit	Weekly Limit	Monthly Limit
Winter (Nov 1 - Jan 31)	NL	NL	NL	NL

Spring (Feb 1 - Mar 31)	5.9	4.9	5.5	4.6
Summer (April 1 - Oct 31)	3.9	3.2	3.6	3.0

Note that the current analysis did not rerun the mixing model used in the 1997 report, *Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant*, to recalculate dilution and decay factors. The current analysis also did not rerun the VIMS model to recalculate acute criteria, as was done in the 2005 report.

Please let us know if we can provide additional information to you.

Sincerely,

Daniel Schechter, PE
Associate

COMMONWEALTH OF VIRGINIA
DEPART‾ ‾ENT OF ENVIRONME‾ ‾AL QUALITY
Water Division - Office of Water Permit Support
629 East Main Street Richmond, Virginia 23219

M E M O R A N D U M

Subject: Mooney WTP mixing analysis

To: Lyle Anne Collier, NRO

From: M. Dale Phillips, OWPS Dale

Date: February 18, 1997

Copies:

RECEIVED
FEB 20 1997
Northern VA. Region
Dept. of Env. Quality

I have completed a review of the technical memorandum that addresses the comments we had on the original study and provides additional material. I believe that the 1995 mixing study and this addendum provide estimates of exposure times that are sufficiently reasonable to provide the basis for the calculation of permit limits.

Call if you have questions or comments.

Attachment #

Division of Engineering & Wastewater

Richard C. Thoesen, P.E., Director

Prince William County Service Authority

H. L. Mooney Wastewater Treatment Plant
P. O. Box 2266 • 1851 Rippon Boulevard • Woodbridge, Virginia 22193-0266 • (703) 670-8101 • Fax (703) 670-8101

January 24, 1997

RECEIVED
JAN 24 1997
Northern VA. Region
Dept. of Env. Quality

Ms. Lyle Anne Collier
Virginia Department of Environmental Quality
Northern Virginia Regional Office
13901 Crown Court
Woodbridge, VA. 22193

Subject: Prince William County Service Authority
H. L. Mooney WWTP NPDES Permit Reissuance

Dear Ms. Collier:

We are pleased to provide the enclosed copies of the technical memorandum "Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H. L. Mooney Wastewater Treatment Plant". We believe this document provides a technically sound basis for winter time ammonia permit limits and also shows that the proposed Potomac Embayment Standards for ammonia are fully protective during the summertime.

Based on the analyses the requested instream waste concentrations (IWC) to use in assessing the chronic toxicity potential of substances and whole effluent are as follows:

Mooney WWTP Flow Conditions	IWC
@ 18 MGD (winter)	37.92%
(summer)	39.17%
@ 24 MGD (winter)	40.53%
(summer)	41.84%

The requested ammonia permit limits (in mg/L as N) for the Mooney WWTP are as follows:

Mooney WWTP Flow Conditions	Monthly Avg	Weekly Avg
18 MGD (winter)	5.35	6.58
(summer)	1.0	-
24 MGD (winter)	4.65	5.72
(summer)	1.0	-

These effluent limits for ammonia do not reflect any additional relief offered by the outcome of our proposed site-specific ammonia study. We will keep you appraised of our progress.

Please call Mark Kennedy (301-817-3700) or Steve Bennett (703-670-8101) if you have questions or if you would like to discuss these issues further.

Sincerely,

Richard C. Thoesen, P.E.
Director of Engineering & Wastewater

Attachments

cc: Robert Canham
Steve Bennett
Mark Kennedy (Greely & Hansen)

MK/RCT/RAC/pa

PRINCE WILLIAM COUNTY SERVICE AUTHORITY
BASIC ORDERING AGREEMENT, TASK ORDER NO. 14

Technical Memorandum
Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant

Greeley and Hansen
January 1997

1. INTRODUCTION

The Prince William County Service Authority's (PWCSA) H. L. Mooney Wastewater Treatment Plant discharges treated effluent to Neabsco Creek, a constricted embayment of the Potomac River. The Plant effluent must meet the requirements of the Potomac Embayment Standards (PES) for ammonia in the summer months (April-October) and water quality-based ammonia standards in the winter months (November-March). Specifically, the PES require a 30-day average effluent concentration of 1 mg/L of ammonia as nitrogen (April through October) and the water quality-based standards are those published in the Virginia Water Quality Standards at VR 680-21-01.14.B.

The Virginia Department of Environmental Quality (VDEQ) developed preliminary permit limits for ammonia and initiated discussions with the PWCSA as part of the VPDES permit reissuance process. The purpose of this technical memorandum is to assist the PWCSA in developing appropriate water quality-based permit limits for ammonia and to address updates to the Neabsco Creek dilution model, near-field mixing and an evaluation of ambient pH and temperature data used in the ammonia permitting process for the Mooney WWTP.

2. Neabsco Creek Dilution Modeling - Update

A report on the first phase of the dilution study was submitted to the VDEQ for review and provided a technical basis for ammonia permit limitations necessary in the Mooney WWTP permit (Greeley and Hansen and Limno-Tech, Inc., 1995). The report predicted dilution rates for the Mooney WWTP effluent in the various Neabsco Creek Model sections, the times of exposure for a drifting organism and the length of time necessary to flush and replace the receiving water in the vicinity of the Mooney WWTP outfall.

VDEQ reviewed the report and made the following observations (M. Dale Phillips, 1996):

a. The Neabsco Creek Model assumes complete mix in each of the model segments and therefore cannot be used to define the extent of acute physical mixing area (PMA).

b. The hydraulic behavior of the system [Neabsco Creek] is well known because the model was calibrated and verified using dye study results.

c. Hydraulic flushing time and drifting organism exposure predictions are a valid means of defining the duration of exposure for chronic toxicity.

d. Flushing time in the lower segments of Neabsco Creek [nearer to the Potomac River] need to be included in the evaluation before approval of the results for chronic toxicity may be made.

VDEQ staff requested that the Dale City WWTP flow be considered as a pollutant source equivalent to the Mooney WWTP. Model runs were subsequently run incorporating these additional factors in order to fully address VDEQ concerns.

2.1 Near-Field Mixing Evaluation

The purpose of the near-field mixing evaluation is to confirm that rapid and complete mixing takes place within model segments 5 and 6 of Neabsco Creek and to establish, if possible, the extent of an acute physical mixing area.

The following elements are incorporated into a CORMIX (version 3.1) analysis of the near-field mixing.

- Maintaining the Mooney WWTP flows at 18 and 24 MGD
- Varying mannings "n" factor (for friction) to assess the effect of aquatic vegetation on mixing characteristics.
- Summer (7Q10=0.0 MGD) and winter (7Q10=1.03 MGD) ambient upstream flow
- Dale City WWTP flow equal to 6 MGD
- Mixing plume buoyancy due to temperature effects
- Additional inputs necessary for the model as shown in Attachment 1

The predicted distance and travel time to achieve complete mixing for each scenario is as follows:

Complete Mixing Distance and Travel Time
for H.L. Mooney WWTP Discharge to Neabsco Creek.

Seasonal and tidal conditions	Mooney @ 18 MGD		Mooney @ 24 MGD	
	Distance (meters)	Time (hours)	Distance (meters)	Time (hours)
Summer				
No tidal movement	131	1.3	235	2.4
With tidal movement	70	0.8	70	0.6
Winter				
No tidal movement	185	5.9 (1)	70	0.9
With tidal movement	69	0.9	77	1.0

Note: (1) This predicted travel time is inconsistent with other results and may be overestimated.

The following conclusions are based on the results of the near-field simulations:

a. For both summer and winter conditions, CORMIX3 confirms that the Mooney WWTP effluent completely mixes across Neabsco Creek within a maximum distance of 69 to 235 meters, depending on the season, tidal conditions and effluent flow rate.

b. The predicted maximum complete mix distance is less than the length of the VIMS Neabsco Creek Model segments 5 and 6, which are 360 and 490 meters respectively. Therefore, the VIMS Neabsco Creek Model complete mix assumption is valid.

c. The relationship between the travel times are generally correct (except for one winter simulation noted above) and the times are less than or equal to one hour when tidal movement is considered.

d. Varying Mannings "n" friction factor had little or no effect on the near field mixing characteristics. Therefore, the presence of aquatic vegetation should not significantly affect mixing characteristics or the extent of the physical mixing area.

2.2 Updated Neabsco Creek Dilution Analysis

The Neabsco Creek Model was applied to evaluate dilution in Neabsco Creek in the previous report. This model is rerun here to respond to VDEQ comments and incorporates the following changes:

- Maintaining the Mooney WWTP flows at 18 and 24 MGD.
- Separate summer (7Q10 = 0.0 MGD) and winter conditions (7Q10 = 1.03 MGD) as provided by VDEQ.
- Dilution with settling and without settling.
- Dale City WWTP flow equal to 6.0 MGD with the same pollutant concentrations as the Mooney WWTP (i.e. no dilution from the Dale City flow).

The results of the model are presented in Table 1 (Dilution Rates) and in Table 2 (Exposure Times). These updated results do not indicate as much dilution available as in the previous model runs. They do, however, provide a basis for dilution for both the Dale City and Mooney WWTPs based on drifting organism exposure.

2.3 Drifting Organism Exposure Analysis for Chronic Toxicity Evaluation

Neabsco Creek is a tidally flushed, constricted embayment of the Potomac River. The creek is neither free flowing nor a deep tidal water and therefore falls outside the normal pattern described in VDEQ guidance. A drifting organism exposure time of two days (instead of four days) was used in accordance with VDEQ guidance to judge the acceptability of an effluent with regard to chronic toxicity. This approach was discussed in detail in the previous report (Greeley and Hansen and Limno-Tech, Inc., 1995).

VDEQ requested in their review of the previous report, that the Dale City WWTP flow be included in the model as a pollutant source equal to the Mooney WWTP. The updated Neabsco Creek dilution analysis incorporates this recommendation. However, this modification results in the model describing not only the Mooney WWTP impact but the impacts of the Dale City WWTP as well. Since there are no other point source discharges to Neabsco Creek, the updated model results provide a basis for a wasteload allocation for the entire water body. As such, it is appropriate to consider a drifting organism exposure to chronic toxicity for a full four (4) days rather than two (2) days. The safety factor to account for additional discharges need not be maintained since both dischargers to Neabsco Creek have been incorporated into the same model.

The method to calculate the average effluent exposure of a drifting organism is to multiply the dilution factor in each segment (in terms of percent effluent) by the time the organism is resident in that segment. The products of segment dilutions and exposure times are then added and the sum is divided by the cumulative exposure for the organism -- held to four days for the purposes of chronic toxicity evaluations. The calculations for the Mooney WWTP are in Attachment 2 and the results are as follows:

Average Four-Day Effluent Exposure for a Drifting Organism (as percent effluent)		
Season	Mooney @ 18 MGD	Mooney @ 24 MGD
Apr - Oct	39.17% (1)	41.84% (2)
Nov - Mar	37.92% (1)	40.53% (3)

Notes: (1) Four-day exposure terminates in model segment 9.
(2) Four-day exposure terminates in model segment 10.
(3) Four-day exposure terminates just inside model segment 11.

The 4-day exposure in each scenario begins in model segment 5 and terminates in model segments 9, 10 or 11 depending on the ambient conditions and WWTP flow. This means that the drifting organism, beginning at segment 5 (the Mooney discharge) will drift to segments 9, 10 or 11 in four days. The exposures shown above (as percent effluent) are for conservative substances which do not settle or decay and are appropriate for whole effluent toxicity testing evaluations. However, ammonia is not a conservative substance and undergoes decay as it is converted into different nitrogen forms. A first order decay rate coefficient of 0.2 day^{-1} was derived by the Virginia Institute of Marine Sciences (VIMS) and used in the original Neabsco Creek model to predict this ammonia decay. This original decay rate coefficient was based on an ambient temperature of 20°C but can be adjusted to other temperatures using VDEQ guidance (OWRM Guidance memo No. 93-015, Amendment No. 1 -- Mixing Zones, page 18).

VDEQ policy calls for consideration of ammonia decay only in the summer months but not in the winter. The reason for the policy is that ammonia decay is reduced with temperature. However, VDEQ guidance also bases the water quality standard for ammonia on the 90th percentile temperature, which for Neabsco Creek is 18.8°C. The ammonia decay rate coefficient has been reduced here for the 90th percentile temperature of the winter months. The combination of conservative factors including the biased high pH is reason to consider inclusion of a temperature adjusted decay as a reasonable basis for permit calculation. Adjusting the coefficient to the 90th percentile temperature of Neabsco Creek (i.e. 18.8°C) results in a new coefficient of 0.1824 day^{-1}. Applying this rate of decay for the four days of exposure would reduce the effluent exposure for ammonia as follows:

Average Four-Day Ammonia Exposure for a Drifting Organism (as percent effluent)				
Season	Mooney @ 18 MGD		Mooney @ 24 MGD	
	IWC	Dilution Rate	IWC	Dilution Rate
Apr - Oct	18.89%	5.29	20.18%	4.96
Nov - Mar	18.28%	5.47	19.54%	5.12

These ammonia exposure concentrations should be used to calculate the ammonia wasteload allocation for the Mooney WWTP.

3. Development of Ammonia Wasteload Allocations and Permit Limitations

The wasteload allocation can be calculated by dividing the water quality standard by the effective dilution factor expressed as percent effluent. These latter dilution factors have been determined in the previous section. The selection of the appropriate water quality standard for ammonia depends on the ambient pH and temperature of the receiving water.

3.1 Selection of ambient pH and temperature values and the resulting ammonia water quality standard

Several sets of pH and temperature data have been identified in the permitting process by VDEQ. These data are from the Mooney WWTP effluent, Neabsco Creek 50 feet above the Mooney WWTP outfall, Neabsco Creek at the Route 1 bridge and midway into Neabsco Bay. Other pH data useful to the permitting process are at Belmont Bay and at stations in the nearby Potomac River shown in Figure 1. VDEQ guidance requires the use of 90th percentile data to evaluate ammonia toxicity. The 90th percentiles of available pH data are as follows:

Data Source	Number of Data Points	90th Percentile pH Value
Mooney WWTP Effluent	1645	7.23
Neabsco Creek 50' above the Mooney WWTP Outfall	234	7.83
Neabsco Creek @ Route 1	141	7.5
Neabsco Bay	214	9.7
Belmont Bay	206	9.9
Woodrow Wilson Bridge (Potomac)	33,684	8.0
Dogue Creek (Potomac)	579	8.1
Indian Head, MD (Potomac)	1176	8.2
Quantico Creek (Potomac)	757	8.1
Aquia Creek (Potomac)	585	8.0

From the pH data available, the following observations and conclusions should be made:

a. Potomac River 90th percentile pHs are consistent both above and below Neabsco Bay.

The data indicate mild pH fluctuations depending on the time of year, with higher pHs measured in the summer months due to increased photosynthetic activity. The Woodrow Wilson Bridge Station was measured continuously from 1989-1992 and demonstrated the diurnal pattern of pH fluctuations due to photosynthetic activity.

b. <u>Neabsco and Belmont Bays, both adjacent to the Occoquan Bay, have the highest 90th percentile pHs.</u>

Neabsco and Belmont Bays are shallow embayments of the Potomac River. Their shallow depth permits higher temperatures and more light penetration to support aquatic plant life. The pH swings in these waterbeds are reflective of this increased photosynthetic activity. Clearly, if the ambient pH of these bays were consistently above 9.0, the aquatic life in these and adjacent water bodies would be adversely affected. The highest pH values typically occur in the early to mid-afternoon which is when sampling usually occurs. If pH sampling were continuous, including night and early morning readings, the 90th percentile values for these bays would be shown to be lower. This high pH bias adds a level of conservatism to the analysis of the data.

c. <u>Neabsco Creek 90th percentile pHs are lower than the 90th percentile pHs in the</u> embayments and the Potomac River.

The low dilution predicted in the Neabsco Creek (i.e. the high percentage of effluent in the creek) indicates that effluent characteristics will influence the creek more than the ambient water available from the incoming stream and tidal movements. The pH data bears this out with the WWTP effluents effectively buffering the ambient Neabsco Creek pH. The Neabsco Creek 90th percentile pH is 7.83 (not greater than 9.0 as in Neabsco Bay) and is greatly influenced by the effluents of the Dale City and Mooney WWTPs due to the minimal dilution available. As the Mooney WWTP expands and increases its flow to 18 and 24 MGD, the influence of the treated effluents on pH will also increase. It is important to note that photosynthetically induced diurnal pH fluctuation also occurs in Neabsco Creek, but with a lower amplitude due to the buffering effect of the WWTP effluents. However, it can be expected that the Neabsco Creek pH of 7.83 is also biased high due to the time of sampling.

The ambient pH and temperature selected to determine the ammonia water quality standard should reflect the conditions of the water body in question. Since the drifting organism will remain within Neabsco Creek for almost the entire four days, the chronic ammonia water quality standard, which is applied as a four-day exposure, should be based on the available Neabsco Creek pH and temperature data. Therefore the Neabsco Creek pHs (7.82 for summer and 7.86 for winter) and temperatures (27°C for summer and 18.8°C for winter) can be used to calculate the chronic ammonia criteria. See p 7a + 7b for the derivation of these values Jac

The higher pH values of Neabsco Bay should not be used to calculate the chronic ammonia criteria for the following reasons:

Calculating the Exposure Concentration for a Drifting Organism in Neabsco Bay

(Temperature Data from G&H, 2005; Other information is taken directly from G&H, 1997)

Winter Conditions (11/1 to 2/14), Mooney @ 18 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.4	0.714	0.19	0.19	0.136
6	1.6	0.625	0.47	0.66	0.294
7	2	0.500	0.28	0.94	0.140
8	2.7	0.370	1.2	2.14	0.444
9	3.7	0.270	1.86	4	0.503
Total					1.517

Effluent Exposure	37.92%
Temperature (degrees C)	11.6
Ammonia Decay	0.1050
Ammonia Exposure	**24.91%**
Dilution Ratio	**4.01**

Winter Conditions (11/1 to 2/14), Mooney @ 24 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.3	0.769	0.16	0.16	0.123
6	1.4	0.714	0.38	0.54	0.271
7	1.7	0.588	0.23	0.77	0.135
8	2.3	0.435	0.97	1.74	0.422
9	3.1	0.323	1.9	3.64	0.613
10	5.3	0.189	0.28	3.92	0.053
11	19.8	0.051	0.08	4	0.004
Total					1.621

Effluent Exposure	40.53%
Temperature (degrees C)	11.6
Ammonia Decay	0.1050
Ammonia Exposure	**26.63%**
Dilution Ratio	**3.76**

Spring Conditions (2/15 to 3/31), Mooney @ 18 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.4	0.714	0.19	0.19	0.136
6	1.6	0.625	0.47	0.66	0.294
7	2	0.500	0.28	0.94	0.140
8	2.7	0.370	1.2	2.14	0.444
9	3.7	0.270	1.86	4	0.503
Total					1.517

Effluent Exposure	37.92%
Temperature (degrees C)	10.4
Ammonia Decay	0.0955
Ammonia Exposure	**25.88%**
Dilution Ratio	**3.86**

Spring Conditions (2/15 to 3/31), Mooney @ 24 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.3	0.769	0.16	0.16	0.123
6	1.4	0.714	0.38	0.54	0.271
7	1.7	0.588	0.23	0.77	0.135
8	2.3	0.435	0.97	1.74	0.422
9	3.1	0.323	1.9	3.64	0.613
10	5.3	0.189	0.28	3.92	0.053
11	19.8	0.051	0.08	4	0.004
Total					1.621

Effluent Exposure	40.53%
Temperature (degrees C)	10.4
Ammonia Decay	0.0955
Ammonia Exposure	**27.67%**
Dilution Ratio	**3.61**

Calculating the Exposure Concentration for a Drifting Organism in Neabsco Bay

(Temperature Data from G&H, 2005; Other information is taken directly from G&H, 1997)

Formulas Used

Effluent_Exposure = Exposure_Product / Cumulative_Exposure
Ammonia_Decay = 0.2 x 1.08 ^ (T - 20) where T = Temp in deg C
Ammonia_Exposure = Effluent_Exposure x e^(-Ammonia_Decay * Cumulative_Exposure)
Dilution_Ratio = 1 / Ammonia_Exposure

References:

Greeley and Hansen, 1997. "Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant"

Greeley and Hansen, 2005. "Prince William County Service Authority, H.L. Mooney Water Reclamation Facility, VPDES Permit No. VA0025101, In-Stream Monitoring Report for the Evaluation of Ammonia Effluent Limitations."

6/22/2009 7:48:46 AM

Facility = HL Mooney (18 MGD)
Chemical = Ammonia (Apr-Oct)
Chronic averaging period = 30
WLAa = 20
WLAc = 3.65
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 7.36449584096953
Average Weekly limit = 4.39295922424408
Average Monthly LImit = 3.65

The data are:

9

6/22/2009 7:49:47 AM

Facility = HL Mooney (24 MGD)
Chemical = Ammonia (Apr-Oct)
Chronic averaging period = 30
WLAa = 18
WLAc = 3.4
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 6.86007831761546
Average Weekly limit = 4.09207160614517
Average Monthly LImit = 3.4

The data are:

9

1/14/2009 1:49:31 PM

Facility = HL Mooney 18 MGD
Chemical = Ammonia (Nov-Jan)
Chronic averaging period = 30
WLAa = 32
WLAc = 11.6
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

1/14/2009 1:49:12 PM

Facility = HL Mooney 24 MGD
Chemical = Ammonia (Nov-Jan)
Chronic averaging period = 30
WLAa = 32
WLAc = 10.9
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Prince William County, Virginia.

PUBLIC COMMENT PERIOD: XXX, 2009 to 5:00 p.m. on XXX, 2009

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – [Wastewater] issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: PRINCE WILLIAM COUNTY SERVICE AUTHORITY, PO BOX 2266, WOODBRIDGE, VA 22195, VA0025101

NAME AND ADDRESS OF FACILITY: HL Mooney Water Reclamation Facility, 1851 Rippon Blvd, Woodbridge, VA 22191

PROJECT DESCRIPTION: Prince William County Service Authority has applied for a reissuance of a permit for the public HL Mooney Water Reclamation Facility. The applicant proposes to release treated sewage wastewaters from residential areas at a rate of 18 million gallons per day into a water body with a future flow tier of 24 million gallons per day. Sludge from the treatment process will be incinerated. The facility proposes to release the treated sewage in the Neabsco Creek in Prince William County in the Potomac River watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, cBOD, TSS, Ammonia as Nitrogen, Total Nitrogen, Total Phosphorus, Dissolved Oxygen and E. coli

This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the documents at the DEQ-Northern Regional Office by appointment.
Name: Alison Thompson
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3834   E-mail: althompson@deq.virginia.gov   Fax: (703) 583-3821

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	H.L. Mooney Water Reclamation Facility
NPDES Permit Number:	VA0025101
Permit Writer Name:	Alison Thompson
Date:	January 15, 2009

Major [X] **Minor** [ ] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?			
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit? Total Residual Chlorine	X		
10. Does the permit authorize discharges of storm water?		X	

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?	X		
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs
(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		
List of Standard Conditions – 40 CFR 122.41 Duty to comply Duty to reapply Need to halt or reduce activity not a defense Duty to mitigate Proper O & M Permit actions Property rights Duty to provide information Inspections and entry Monitoring and records Signatory requirement Bypass Upset Reporting Requirements Planned change Anticipated noncompliance Transfers Monitoring reports Compliance schedules 24-Hour reporting Other non-compliance			
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Alison Thompson
Title	Environmental Specialist II
Signature	
Date	January 15, 2009

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME I

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike, Suite 400
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by
Camp Dresser & McKee

June 12, 1987

Attachment #

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME I:
Study Methodology, Water Quality Goals, and Loading and Debugging of Computer Models

EXECUTIVE SUMMARY

The initial stages of the Potomac Embayments Wasteload Allocation Study lay the groundwork for the technical analyses that are performed to develop recommended effluent limits for point source discharges to seven Virginia embayments of the Potomac Estuary. First, modeling tools to be used in the study are obtained and tested. Next, a regionally consistent methodology for wasteload allocation analysis is developed. Finally, water quality goals are developed for use as evaluation criteria in screening wasteload allocation alternatives in later stages of the study.

Embayment hydrodynamics and water quality models developed by the Virginia Institute of Marine Science (VIMS) are obtained from VIMS and loaded onto the mainframe computer system used by NVPDC. The computer codes are modified as necessary to ensure successful operation on the system. The model codes are further modified to enhance their capability and, in several cases, to correct minor errors.

The regionally consistent methodology established for the study defines the modeling approach and the general procedures for establishing design conditions, defining water quality goals, performing sensitivity studies, and completing final wasteload allocation analyses. As part of the methodology, specific data for computer model application are developed, including nonpoint loadings, Potomac main stem boundary conditions, and design values for tidal ranges, streamflows, water temperature, and solar radiation.

The water quality goals established for the study focus primarily on concentrations of dissolved oxygen and chlorophyll-a. The selected dissolved oxygen goals are the Virginia state water quality standards of 5.0 mg/L daily average and 4.0 mg/L daily minimum. Chlorophyll-a goals are developed based on the concept of no further deterioration of existing conditions, which is consistent with the State's antidegradation policy. Specific chlorophyll-a goals are established for each embayment, primarily based on computer model simulations that show the impacts of point source loadings and Potomac main stem boundary conditions on chlorophyll-a concentrations throughout the embayment.

CONTENTS

CONTENTS (CONTINUED)

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME II

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike, Suite 400
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by
Camp Dresser & McKee

June 12, 1987

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME III

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by

Camp Dresser & McKee

June 30, 1988

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME III:

Sensitivity Studies and Final Analyses for the Four Mile Run, Hunting Creek, and Neabsco Creek Embayments

EXECUTIVE SUMMARY

In accordance with the regionally consistent methodology presented in the Volume I final report, NVPDC and CDM conduct sensitivity studies and final analyses for the Four Mile Run, Hunting Creek, and Neabsco Creek embayments. Modeling tools developed by the Virginia Institute of Marine Science are used to predict the embayment water quality impacts of alternative treatment plant wasteloads. The modeling results are compared to water quality goals developed and presented in the Volume I final report to determine appropriate treatment plant effluent limits.

The sensitivity studies predict the extent to which embayment water quality would be affected by changes in parameters such as treatment plant loading, Potomac main stem boundary conditions, benthic flux rates, and treatment plant discharge location. After comparing the modeling results to the appropriate water quality goals, several different wasteload allocation alternatives for each embayment are selected for further analysis.

For the alternatives selected in the sensitivity studies, the final analyses include a comparison of wastewater treatment costs and of pollutant exchange between the embayment and the Potomac main stem. In addition, analyses of seasonal treatment limits for phosphorus and unoxidized nitrogen are conducted. The analysis of seasonal phosphorus removal is limited by a lack of data; as a result, no recommendations are made regarding the feasibility of seasonal phosphorus limits. The analyses for the Hunting Creek and Four Mile Run embayments incorporate the results of a recently completed Metropolitan Washington Council of Governments study of dissolved oxygen in the upper Potomac Estuary.

Based on the sensitivity studies and final analyses, the following effluent limits for dissolved oxygen (DO), 5-day carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are recommended for protection of embayment water quality:

EMBAYMENT	TREATMENT PLANT	PLANT FLOW (MGD)	RECOMMENDED EFFLUENT CONCENTRATION (mg/l) DO	CBOD5	TKN	TP
Four Mile Run	Arlington	40.0	6.0	10.0	---	1.00
Hunting Creek	Alexandria	54.0	7.6*	3.0	---	1.00
				-or-		
			7.6*	10.0	1.0**	1.00
Neabsco Creek	Dale City #1	4.0	6.0	10.0	---	1.00
	Dale City #8	2.0	6.0	10.0	---	1.00
	Mooney	20.0	6.0	10.0	---	1.00

*April 1 through October 31 only; limit of 6.0 mg/L November 1 through March 31

**April 1 through October 31 only; no TKN limit November 1 through March 31

To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/l is regionally accepted as presented in the Interim Control Policy of the 1986 Supplement to the Metropolitan Washington 208 Plan. Therefore, at the present time, the more restrictive constraint on total phosphorus is the 0.18 mg/l limit for protection of the main stem of the Potomac. As indicated in the 208 Plan Supplement, long-term Potomac studies now under way will better define the total phosphorus limits required for protection of the Potomac main stem.

Division of Engine g
& Wastewater

Richard C. Thoesen, P.E., Director

Prince William County Service Authority

H. L. Mooney Wastewater Treatment Plant
P.O. Box 2266 • 1851 Rippon Boulevard • Woodbridge, Virginia 22193-0266 • (703) 670-8101 • Fax (703) 590-5877

November 21, 1997

RECEIVED
NOV 21 1997
Northern VA. Region
Dept. of Env. Quality

Mr. Thomas A. Faha
Department of Environmental Quality
Northern Virginia Regional Office
13901 Crown Court
Woodbridge, Virginia 22193

Re: H. L. Mooney AWWTP - Draft VPDES Permit VA0025101

Dear Mr. Faha:

On behalf of the Service Authority, I thank you for meeting with us on November 19, 1997, to discuss our concerns with the Draft VPDES Permit. The purpose of this letter is to document our remaining concerns and to support our request that the permit be revised.

Weekly Average Ammonia

We disagree with the application of the 1.5 ratio utilized for the weekly average. Although this empirical ratio is normally used for a weekly standard, it is based on a monthly water quality standard. The ammonia nitrogen standard for the H. L. Mooney AWWTP is a voluntary standard and is technology based, not water quality based. Accordingly, the weekly standard should be water quality based and doing so will fully protect the tributary. The water quality standards are as follows:

1. The toxicity based evaluations included in the permit Fact Sheet as Attachment 13.

2. The wasteload allocation evaluations conducted for Neabsco Creek by NVPDC dated June 30, 1988 (copy attached). These studies show that the dissolved oxygen standard will be set at ammonia discharges of 20 mg/l.

Evaluation of the foregoing studies shows that toxicity and dissolved oxygen standards for ammonia as nitrogen will be met with the limits recommended in Attachment 13 as follows:

	Weekly Average - mg/l	
Parameter	18 mgd	24 mgd
Ammonia as nitrogen (April - October)	5.0	4.7

We request that these limits be included in the draft permit.

Metals Monitoring

We also discussed analyses for metals monitoring (Appendix A) during our November 19, 1997 meeting. The Service Authority's position is that only analytical methods included in 40 CFR Part 136 or approved by the USEPA Regional Administrator with the concurrence of the DEQ Director may be used. We disagree, therefore, with DEQ's intention to include unapproved 200 and 1600 series analytical methods in our VPDES permit.

We appreciate your time and consideration of our comments and the opportunity to review the draft permit.

Sincerely,

Richard C. Thoesen
Director of Engineering & Wastewater

Attachment

cc: Steve Bennett
Bob Canham
Ron Bizzarri

RCT/ls

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY

FINAL REPORT, VOLUME III:

SENSITIVITY STUDIES AND FINAL ANALYSES FOR THE FOUR MILE RUN, HUNTING CREEK AND NEABSCO CREEK EMBAYMENTS

A Staff Technical Analysis

Prepared for
STATE WATER CONTROL BOARD

Prepared by
NORTHERN VIRGINIA PLANNING DISTRICT COMMISSION

with Technical Assistance Provided by
CAMP DRESSER & McKEE

JUNE 30, 1988

10.0 FINAL WLA ALTERNATIVE ANALYSIS FOR NEABSCO CREEK

10.1 EMBAYMENT DESIGN CONDITIONS

In addition to the established low flow and high temperature design conditions, three other conditions are set for the final analysis of the WLA alternatives. They include: Potomac Estuary boundary conditions, benthic flux rates, and discharge location.

Changes to the Potomac Estuary boundary chlorophyll-a concentration from 80 ug/L (design conditions) to 100 and 50 ug/L did not significantly impact the daily minimum or minimum daily average DO concentrations which occurred for the most part in the uppermost segments of Neabsco Creek. These changes were analyzed with the Interim Control Decision with and without nitrification. The 80 ug/L chlorophyll-a goal for the downstream zone is violated only when a Potomac Estuary boundary of 100 ug/L is assumed, and the violation occurs regardless of the total phosphorus effluent concentration for the three WWTPs that discharge to Neabsco Creek. The chlorophyll-a goal of 30 ug/L in the upstream zone 2 is not exceeded for the increased boundary condition of 100 ug/L. Therefore, the design chlorophyll-a boundary concentration of 80 ug/L at the Potomac Estuary is used for the final analysis.

Benthic flux rates for ammonia and SOD were analyzed for ± 30 percent of the calibrated values. The embayment response of dissolved oxygen concentrations was not sensitive to these changes in benthic flux rates and thus the calibrated rates are used in the final analysis.

The sensitivity of the embayment water quality to different treatment plant locations was performed for the Mooney treatment plant. Different locations for the Dale City treatment plants were not analyzed. The analysis showed that the upstream discharge location reduced the daily minimum and minimum daily average dissolved oxygen concentrations below the values at the present discharge location. At the upstream location the daily average dissolved oxygen standard was violated. The minimum dissolved oxygen values at the downstream location were similar to the values at the present discharge location. Therefore, the final analysis includes wasteload allocation investigations at the present discharge location for the Mooney wastewater treatment plant.

In summary, the final alternatives are analyzed with the design Potomac Estuary boundary condition, calibrated benthic flux rates and at the present discharge location.

10.2 WLA ALTERNATIVES

The wasteload allocation alternatives include the following:

1. Interim Control Decision without nitrification (TP = 0.18 mg/L), and

2. Interim Control Decision without nitrification with an effluent total phosphorus of 1.0 mg/L.

Alternatives 1 and 2 are selected based on the results of the sensitivity study. Table 10-1 presents the effluent concentrations for the two WLA alternatives. The alternatives only differ in the total phosphorus concentrations which are presented in the table as organic phosphorus and orthophosphorus.

The impact of the two wasteload allocation alternatives on the dissolved oxygen and chlorophyll-a in the embayment are presented in Table 10-2. The state's dissolved oxygen standards and the chlorophyll-a goals established as part of this study are met by both alternatives. At a discharge of 20.0 mgd for Mooney and 6.0 mgd for the two Dale City plants combined, the minimum daily average DO is 5.3 mg/L and the daily minimum DO is 4.6 mg/L for both alternatives. The Interim Control Decision alternatives are modeled with a CBOD5 of 10.0 mg/L, ammonia of 20.0 mg/L and dissolved oxygen of 6.0 mg/L.

TABLE 10-1

EFFLUENT CONCENTRATIONS OF WLA ALTERNATIVES

WLA Alternatives	Q (mgd)	Effluent Concentration (mg/L) Org. N	NH3	NO2+ NO3	Org. P	Ortho-P	CBOD5	DO
MOONEY, DALE CITY 1 AND 8[1] (Neabsco Creek)								
1. Interim Control Decision Without Nitrification (TP = 0.18 mg/L)								
Mooney	20.0	0.0	20.0	0.0	0.02	0.16	10.0	6.0
Dale City 1 and 8	6.0	0.0	20.0	0.0	0.02	0.16	10.0	6.0
2. Interim Control Decision Without Nitrification with TP = 1.0 mg/L								
Mooney	20.0	0.0	20.0	0.0	0.10	0.90	10.0	6.0
Dale City 1 and 8	6.0	0.0	20.0	0.0	0.10	0.90	10.0	6.0

[1] With design Potomac Estuary boundary conditions, calibrated benthic flux rates and at existing discharge locations.

TABLE 10-2

NEABSCO CREEK
WATER QUALITY MODEL PROJECTIONS FOR WLA ALTERNATIVES

WLA Alternative	DO (mg/l)		CHLA (ug/l)	
	Daily Minimum	Min. Daily Avg.	Zone 1 Max. Daily Avg.	Zone 2 Max. Daily Avg.
1. Interim Control Decision Without Nitrification (TP=0.18 mg/L)	4.6(5)[1]	5.3(2)	75(10)	17(5)
2. Interim Control Decision Without Nitrification and TP=1.0 mg/L	4.6(5)	5.3(2)	76(10)	18(5)

[1]Numbers in parenthesis denote location of constituent concentration by model segment.

The maximum daily average chlorophyll-a concentrations in the downstream zone 1 are dominated by the Potomac main stem boundary condition of 80 ug/L. The different alternative phosphorus concentrations in the plant discharge do not have a significant impact on the chlorophyll-a concentrations in the downstream reaches. For an increase of total phosphorus from 0.18 mg/L to 1.0 mg/L, the maximum daily average chlorophyll-a of zone 1 increases from 75 ug/L to 76 ug/L. These values are below the 80 ug/L chlorophyll-a goal for zone 1. In the upstream zone 2, the increase in total phosphorus from alternative number 1 to alternative number 2 only increases the maximum daily average chlorophyll-a from 17 ug/L to 18 ug/L. These concentrations are below the 30 ug/L chlorophyll-a limit established for zone 2.

10.3 POLLUTANT FLUX TO THE POTOMAC MAIN STEM

The net fluxes of ammonia, BOD and total phosphorus from the embayment to the Potomac main stem are determined for the WLA alternatives. For each of the three constituents Table 10-3 presents the WWTP load, the net flux due to the WWTP and the percent of the WWTP load exported to the Potomac. For both alternatives about 90 percent of the WWTP ammonia load is exported to the Potomac main stem, and almost 50 percent of the WWTP CBODU load is exported. For the two different total phosphorus loads (TP=0.18 mg/L for alternative number 1 and TP=1.0 mg/L for alternative number 2) the amount of the WWTP load exported to the Potomac main stem is about 45 percent.

10.4 SEASONAL NITRIFICATION

Under the summer design conditions, nitrification was not required for the Mooney and the two Dale City wastewater treatment plants to meet the State's dissolved oxygen standards for Neabsco Creek. Therefore, an evaluation of seasonal nitrification is not required.

TABLE 10-3

NEABSCO CREEK
POTOMAC MAIN STEM FLUX PROJECTIONS FOR WLA ALTERNATIVES

Constituent	WWTP Load (mg/L)	WWTP Load (kg/day)	Net Flux Due to WWTP (kg/day)	Percent of WWTP Load to Potomac
Ammonia-N (Without Nitrification)	19.2[1]	1,890	1,730	91
CBODU (CBOD5 = 10.0 MG/L)	26.2[1]	2,580	1,220	47
Total Phosphorus (0.18 mg/L)	0.18	18	8.4	47
Total Phosphorus (1.0 mg/L)	1.0	99	40.9	42

[1] WWTP load values reflect ammonia and BOD decay for Dale City WWTP's and thus are slightly less than the normal 20.0 mg/L for ammonia and 27.0 mg/L for CBODU

10.5 SEASONAL PHOSPHORUS REMOVAL

The potential for phosphorus accumulation within the embayments during months when stringent treatment standards are not imposed is evaluated for the Mooney and Dale City WWTPs. A specific methodology has been developed to consider winter accumulation and summer release of phosphorus from the benthos for the point source contribution only. The overall approach assumes that the WWTP phosphorus which settles out during the winter months is released back into the water column during the summer months at the same rate. Studies have shown that phosphorus can accumulate for several years and then can be released at a high rate during special conditions. To predict long term settling and periodic release is beyond the scope of this study. Therefore the daily accumulation of phosphorus is translated to a release rate which is applied to the low flow, high temperature, design conditions. The analysis is conducted using the calibrated model and does not consider extreme events such as anoxic conditions or very low pH which may release more phosphorus than under normal equilibrium conditions. The calibrated Neabsco Creek model has organic P and ortho-P settling rates but does not have calibrated benthic organic P nor ortho-P release rates.

The design condition for this analysis includes an average annual inflow rate for the headwater and incremental flows during the winter time simulation. For this simulation the dissolved oxygen of the upstream and Potomac Estuary boundaries is set at 9.2 mg/L, one mg/L less than saturation at the design temperature of 15 C. The winter time analysis does not include the simulation of algae.

In order to determine the effect of relaxing a more stringent total phosphorus allocation to a less stringent concentration in the winter months, two wasteload scenarios are selected for the analysis which includes a TP = 0.18 mg/L and a TP = 1.0 mg/L for the Interim Control Decision without nitrification. The following approach is conducted. First, the TP = 0.18 mg/L is considered a base line case. The effluent organic phosphorus and orthophosphorus load for the TP = 0.18 mg/L case is subtracted from the corresponding loads for the TP = 1.0 mg/L case to demonstrate the differential load between the two effluent cases. The total fluxes of the organic P and ortho-P to the Potomac Estuary are calculated for the two cases and the differences are computed to produce the differential load exported to the Potomac Estuary. Now, the difference of these differential loads (treatment plant effluent and flux) is the amount of phosphorus accumulated in the embayment from settling due to the treatment plant discharge of 1.0 mg/L where 0.18 mg/L is considered the base case.

For the Mooney and Dale City WWTPs, the incremental organic P and ortho-P are 8.1 kg/d and 72.7 kg/d, respectively. The incremental organic P and ortho-P fluxes to the Potomac are 3.6 kg/d and 38.0 kg/d, respectively. Therefore, the incremental phosphorus accumulation is 4.5 kg/d for organic P and 34.7 kg/d for ortho-P.

The organic P and ortho-P accumulation rates are then applied to the model during the summer time design condition as release rates. The benthic phosphorus release rates are distributed to reaches 2 through 11 in proportion to the SOD rates which are used to indicate the distribution of settled constituents from the treatment plant discharges.

Two cases are considered. For the first, the accumulated organic P and ortho-P are both released separately as $g/m^2/day$ in the model. The organic P release rate is 0.003 $g/m^2/day$, and the ortho-P release rate is 0.023 $g/m^2/day$. A maximum average daily chlorophyll-a concentration of 76 ug/L occurs in the downstream zone 1. In the upstream zone 2, 18 ug/L is predicted to occur during the summer with the additional benthic phosphorus releases.

For the second and more conservative case, the winter accumulated organic P and ortho-P are released as all ortho-P during the summer. The release rate is 0.026 $g/m^2/day$. The maximum daily average chlorophyll-a concentrations in zone 1 (76 ug/L) and zone 2 (18 ug/L) are the same as those for the first case. These maximum daily average chlorophyll-a concentrations with the additional phosphorus releases are only 1 ug/L greater than the chlorophyll-a concentration produced without the estimated increase.

10.7 RECOMMENDED WASTELOAD ALLOCATION

Rationale for a WQ-based Weekly Avg Max limit Apr-Oct

The State's dissolved oxygen standards are not predicted to be violated for a CBOD5 of 10.0 mg/l and an ammonia concentration of 20.0 mg/L. Therefore the Interim Control Decision with a CBOD5 of 10.0 mg/L and without nitrification is recommended. A total phosphorus effluent concentration of 1.0 mg/L is not predicted to violate the chlorophyll-a goal of 80 ug/L in Zone 1 and 30 ug/L in Zone 2.

In order to meet the State's dissolved oxygen standard and the embayment's chlorophyll-a management goals, the recommended effluent limits for a 20 mgd discharge for the H.L. Mooney WWTP, a 4 mgd discharge for the Dale City plant #1 and a 2 mgd discharge for the Dale City plant #8 are as follows:

Constituent	Effluent Limit
Dissolved Oxygen (DO)	6.0 mg/L year-round
5-day Carbonaceous Biochemical Oxygen Demand (CBOD5)	10.0 mg/L year-round
Total Kjeldahl Nitrogen (TKN)	No nitrification required
Total Phosphorus (TP)	1.0 mg/L*

Within the embayment, the chlorophyll-a goals are not predicted to be violated for an effluent total phosphorus concentration of 1.0 mg/L. To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/L is regionally accepted as presented in the Interim Control Policy of the 1986 208 Plan Supplement (Wash. COG, 1986). Therefore, at the present time, the more restrictive limit on total phosphorus is the 0.18 mg/L for protection of the main stem Potomac. As indicated in the 208 Plan Supplement, future long-term Potomac Studies being mutually undertaken by COG, the states and EPA will better define the total phosphorus limits required for Potomac main stem protection.

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*The effluent limit is based on the simulation of the low-flow, high-temperature design conditions. Future studies that evaluate effluent constraints for the main stem of the Potomac will consider the feasibility of seasonal phosphorus removal standards.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Northern Regional Office

13901 Crown Court **Woodbridge, VA 22193** **(703) 583-3800**

SUBJECT: TOXICS MANAGEMENT PROGRAM DATA REVIEW
H.L. Mooney Wastewater Treatment Works (VA0025101)
REVIEWER: Douglas Frasier
DATE: 17 November 2008
COPIES: TMP file

PREVIOUS REVIEW: 12 May 2008

DATA REVIEWED:

This review covers the fifth annual acute and chronic toxicity tests conducted in August 2008 for Outfall 001. The toxicity tests were performed on *C. dubia* and *P. promelas* using 24-hour composite samples of the final effluent collected from the outfall.

DISCUSSION:

The results of these toxicity tests, along with the results of previous toxicity tests conducted since 1998 on effluent samples collected from Outfall 001, are summarized in Table 1.

The acute toxicity of the effluent sample was determined with a static 48-hour acute toxicity test using *C. dubia* and *P. promelas* as the test species. The acute test yielded for both species a No Observed Adverse Effect Concentration (NOAEC) of 100% effluent, greater than the instream waste concentration (IWC) of 39.17%; thus passing the acute toxicity criterion.

The chronic toxicity of the effluent samples was determined with a static daily renewal 3-brood survival and reproduction test using *C. dubia* and a static daily renewal 7-day survival and growth test using *P. promelas*. The *C. dubia* chronic toxicity test yielded a No Observed Effect Concentration (NOEC) of 100% effluent, greater than the IWC of 39.17%; passing the chronic toxicity criteria. The *P. promelas* chronic test yielded a NOEC of 100%, equivalent to 1.0 TUc; passing the chronic toxicity criterion.

RECOMMENDATIONS:

The permittee should continue the annual monitoring for Outfall 001 as required by the permit.

FACILITY INFORMATION

FACILITY:	H.L. Mooney Wastewater Treatment Works
LOCATION:	1851 Rippon Boulevard, Woodbridge
VPDES#:	VA0025101
TYPE OF FACILITY:	Municipal, major
REGION/PERMIT WRITER:	NRO / Joan Crowther
PERMIT EFFECTIVE DATE:	13 October 2003
SIC CODE/DESCRIPTION:	4952 / sewage treatment plant Main Industrial Contributor/SIC: NA
OUTFALL/FLOW (MGD):	Outfall 001:18/24 MGD (design flow)

TREATMENT: The treatment facilities consist of screening, grit removal, flow equalization, primary clarification, ferric chloride and polymer addition, activated sludge biological treatment, final clarification, gravity filtration, chlorination and dechlorination. Sludge is gravity thickened, dewatered by belt filter press, and then incinerated.

RECEIVING STREAM/7Q10/IWC: Neabsco Creek; Potomac River Basin and Subbasin; Section 6; Class II; Special Standards: b, NEW-13;
7Q10: NA
IWC: 39.17% for 18 MGD; 41.84% for 24 MGD

TMP EFFECTIVE DATE: 20 June 20 1991

TMP REQUIREMENTS: The permittee is required to conduct annual acute and chronic toxicity testing using 24-hour composite samples of effluent from Outfall 001. The acute tests shall be 48-hour static tests using *Ceriodaphnia dubia* and *Pimephales promelas*. The chronic tests shall be static renewal tests using *Ceriodaphnia dubia* and *Pimephales promelas*.

The tests shall bracket the endpoints:

Acute tests:	NOAEC of 39% or TUa = 2.56
Chronic tests:	NOEC of 39% or TUc = 2.56

BIOLOGICAL TESTING PERFORMED BY: EA Engineering, Science and Technology, Inc.

TO: Alison Thompson, VDEQ
FROM: Daniel Schechter
DATE: June 2, 2009

RE: **Ammonia Limits for H.L. Mooney WRF based on 2005 - 2006 Neabsco Creek pH and Temperature Data**

Please find attached our analysis of the Neabsco Creek pH and Temperature data for the summer period for 2005-2006 and calculations of the Ammonia limits. As discussed, we have combined the 2005 data set collected by PWCSA and the 2006 data set collected by VDEQ.

The 30-day average chronic ammonia criteria was calculated using three methods (forward 30 days, back 30 days, and +/- 15 days) as was done in the prior Monitoring Report. The 90th percentile of the 30-day average chronic ammonia criteria was calculated, and the most stringent of the 3 methods above was selected to determine the appropriate instream criteria level.

Analysis of the 2005 data set and the 2006 data set are shown in separate columns of the attached spreadsheet, and the combined data is shown in the last column of the spreadsheet. There was a difference in the number of data points for each data set. The 2005 summer data was on a 2 hour interval while the 2006 summer data was on a 15 minute interval. To calculate an accurate 90th percentile for the 2005-2006 period, we performed the following data analysis:

1. The 30-day average ammonia criteria were calculated for each timestamp in 2005-2006 using all the data available.
2. The 2006 data was then extracted on a 2 hour interval.
3. The average, 50th percentile, and 90th percentile were calculated on the combined 2005-2006 data.

The analysis resulted in a 90th percentile chronic ammonia criteria (ELS present) of **0.69 mg/L** as N. Using the dilution factors shown in the draft permit of 5.29 (18 MGD) and 4.96 (24 MGD) results in a monthly limit of **3.7 mg/L (18 MGD)** and **3.4 mg/L (24 MGD)**. Using the STATS.EXE program to compute the weekly limit results in weekly limits of **4.4 mg/L (18 MGD)** and **4.1 mg/L (24 MGD)**.

Based on this analysis, we request the following weekly permit limits for ammonia:

	Weekly Limit
18 MGD	4.4 mg/L as N
24 MGD	4.1 mg/L as N

Please contact me if you have any questions or comments.

Daniel Schechter, P.E.
Associate
Greeley and Hansen

Calculation of Summer Ammonia Permit Limits

	Data Source for Temperature and pH Data					
	2006 VDEQ, 90th percentile pH, Temp	2005 PWCSA, 90th percentile pH and Temp	VDEQ Draft Permit Values	2005 PWCSA Data, 90th percentile of 30 day average	2006 VDEQ Data, 90th percentile of 30 day average	2005 PWCSA + 2006 VDEQ Data, 90th percentile of 30 day average
Chronic Ammonia Criteria	0.29	0.21	0.46	0.61	0.88	0.69
Dilution/Decay Factor (18 MGD)	5.29	5.29	5.29	5.29	5.29	5.29
Dilution/Decay Factor (24 MGD)	4.96	4.96	4.96	4.96	4.96	4.96
Monthly Ammonia Limit (18 MGD)	1.53	1.12	2.43	3.23	4.66	3.65
Monthly Ammonia Limit (24 MGD)	1.43	1.05	2.28	3.03	4.36	3.42
Weekly Ammonia Limit (18 MGD)	1.83	1.34	2.92	3.87	5.59	4.38
Weekly Ammonia Limit (24 MGD)	1.72	1.26	2.74	3.63	5.24	4.11